GENERAL LIBRARY,
UNIV. OF MICH.
1 OCT 1898

APPLETONS'
POPULAR SCIENCE
MONTHLY.

OCTOBER, 1898.

THE RACIAL GEOGRAPHY OF EUROPE.*

A SOCIOLOGICAL STUDY.

(*Lowell Institute Lectures, 1896.*)

By WILLIAM Z. RIPLEY, Ph. D.,
ASSISTANT PROFESSOR OF SOCIOLOGY, MASSACHUSETTS INSTITUTE OF TECHNOLOGY; LECTURER IN ANTHROPO-GEOGRAPHY AT COLUMBIA UNIVERSITY.

SUPPLEMENT.—RUSSIA AND THE SLAVS.

ON the east, the west, and the north, the boundaries of the Russian Empire are drawn with finality. Its territory ends where the land ends. The quarter of this empire which is comprised in Europe is defined with equal clearness on three sides and a half. Only along the line of contact with western Europe, shown on our map facing page 724, is debatable territory to be found. Even here a natural frontier

* To a number of eminent anthropologists I am especially indebted for assistance in the collection of original Slavic materials used as the basis of this paper. Among these should be especially mentioned with grateful recognition of their invaluable aid: Prof. D. N. Anutschin, president of the Society of Friends of Natural Science, Ethnology, and Anthropology in the Imperial University at Moscow; Prof. A. Tarenetzky, president of the Imperial Military Medical Academy at St. Petersburg; Prof. Lubor Niederle, of Prague; Dr. Adam Zakrewski, chief of the Statistical Bureau at Warsaw; Dr. Talko-Hryncewicz, now in Transbaikal, Siberia; Dr. Olechnowicz, of Lublin; Dr. Matiegka, of Prague, and others. In the translation of the Slavic monographs, I have been aided by Charles S. Hall, Esq., of the Suffolk bar, and Dr. Leo Wiener, of Harvard University.

All references run to an exhaustive Bibliography of the Anthropology and Ethnology of Europe, which, after more than a year of unceasing application, is about to be issued as a special bulletin by the Boston Public Library. It will contain the complete title in the original language of every monograph to which reference is made. Through the courtesy and liberality of the librarian and trustees, together with the generosity of many Slavic authors, it is due that nearly all these papers, many of them rare, are now in the collections of the library.

runs for a long way on the crest of the Carpathian Mountains. To be sure, Galicia, for the moment, owes political allegiance to Austria-Hungary; but the Ruthenians, who constitute the major part of her population, are nowise distinguishable from the Russians, as we shall soon see. This leaves merely the two extremes of the Baltic-Black Sea frontier in question. The indefiniteness of the southern end of this line, from the Carpathians down, is one cause of that Russian itch for the control of the Bosporus which no number of international conventions can assuage. The Danube could never form a real boundary; a great river like that is rather a unifying factor in the life of nations than otherwise. Hence the great problems of the Balkan Peninsula. From the Carpathians north to the Baltic Sea, likewise, no geographical line of demarcation can be traced with surety. No water shed, worthy of the name, between the Dnieper and Vistula exists, although the one runs east and the other west not far from the present boundary of Poland and Russia. The former country is possessed of no sharply defined area of characterization. The State of Texas has as clear a topographical title to independent political life. The partition of Poland was in a measure a direct result of geographical circumstances. These have condemned this unhappy country, despite the devoted patriotism of her people, to a nondescript political existence in the future. By language the Poles are affiliated with Russia, not Germany; but in religion they are Occidental rather than Byzantine. Thus Poland stands to-day, padded with millions of politically inert Jews, as a buffer between Russia and Teutonism. It is a case not unlike that of Alsace-Lorraine. In both instances the absolute inflexibility of physical environment as a factor in political life is exemplified.

From the Carpathian Mountains, where, as we have said, Russia naturally begins, a vast plain stretches away north and east to the Arctic Ocean and to the confines of Asia; an expanse of territory, in Europe, eleven times as large as France.* Nor is it limited to Europe alone. Precisely the same formation, save for a slight interruption at the Ural Mountains, extends on across Asia, clear to the Pacific Ocean. European Russia, only one quarter the size of Siberia, is, however, the only part of immediate interest to us here. Nowhere in all its vast expanse is there an elevation worthy the name mountain. Even the most rugged portion, the Valdäi Hills in southern Novgorod, are barely one thousand feet high; they are more like a table-land than a geological uplift.

Whatever its local character, be it great peat swamps or barren steppe, the impression of the country is ever the same. Monotony

* Leroy-Beaulieu, 1881–'89, gives a superb description of the country. Its simple geology is shown by map in Petermann, xli, 1895, No. 6.

in immensity; an endless uniformity of geographical environment, hardly to be equaled in any country inhabited by European peoples. Thus is the geographical environment of the Russian people determined in its first important respect. Their territory offers no obstacle whatever to expansion in any direction; the great rivers, navigable for hundreds of miles, are, in fact, a distinct invitation to such migrations. On the other hand, this plain surface and the great rivers offer the same advantages to the foreigner as to the native; there is a complete absence of those natural barriers behind which a people may seek shelter from the incursions of others. The only natural protection which the region offers is in its dense forests and swamps. These, however, unlike mountains, offer no variety of conditions or natural products; they afford no stimulation to advance in culture; they retard civilization in the act of protecting it; they are better fitted to afford refuge to an exiled people than to encourage progress in a nascent one.

The second factor in determining a geographical area of characterization is its relative fertility. As we have observed before, this invites or discourages the movement of populations, in armies or in peaceful migration, just as much as the configuration of the surface makes this an easy or difficult matter. Judged by this second criterion, the territory of European Russia varies considerably. Leroy-Beaulieu divides it into three strips from north to south. The half lying north of a line from Kiev to Kazan (see map on page 731), constituting the forest zone, is light soiled; it varies from heavy forest on the southern edge to the stunted growth of the arctic plains. South of the forest belt, south of a line, that is, from Kiev to Kazan, lies the prairie country. This is the flattest of all; over a territory several times the size of France, a hill of three hundred and fifty feet elevation is unknown. This prairie or woodless strip is of surpassing fertility—the so-called Black Mold belt, just south of the forests, rivaling the basin of the Mississippi in its natural richness of soil. From this the country gradually becomes less and less fertile, with the decreasing rainfall, as we go south. This brings us at last to the third region, that of the barren steppes, or saline deserts, which center about the Caspian Sea. These are found also less extensively north of the Crimean Peninsula, as far west as the lower Dnieper. Their major part lies south and east of the Don River. As Leroy-Beaulieu observes, the real boundary between Europe and Asia, viewed not cartographically, but in respect of culture and anthropology, lies not at the Ural River and Mountains at all, where most of our geographies place it. Sedentary, civilized, racial Europe, roughly speaking, ends at a line, shown on our map, up the Don from its mouth to the knee of the Volga, thence up the latter

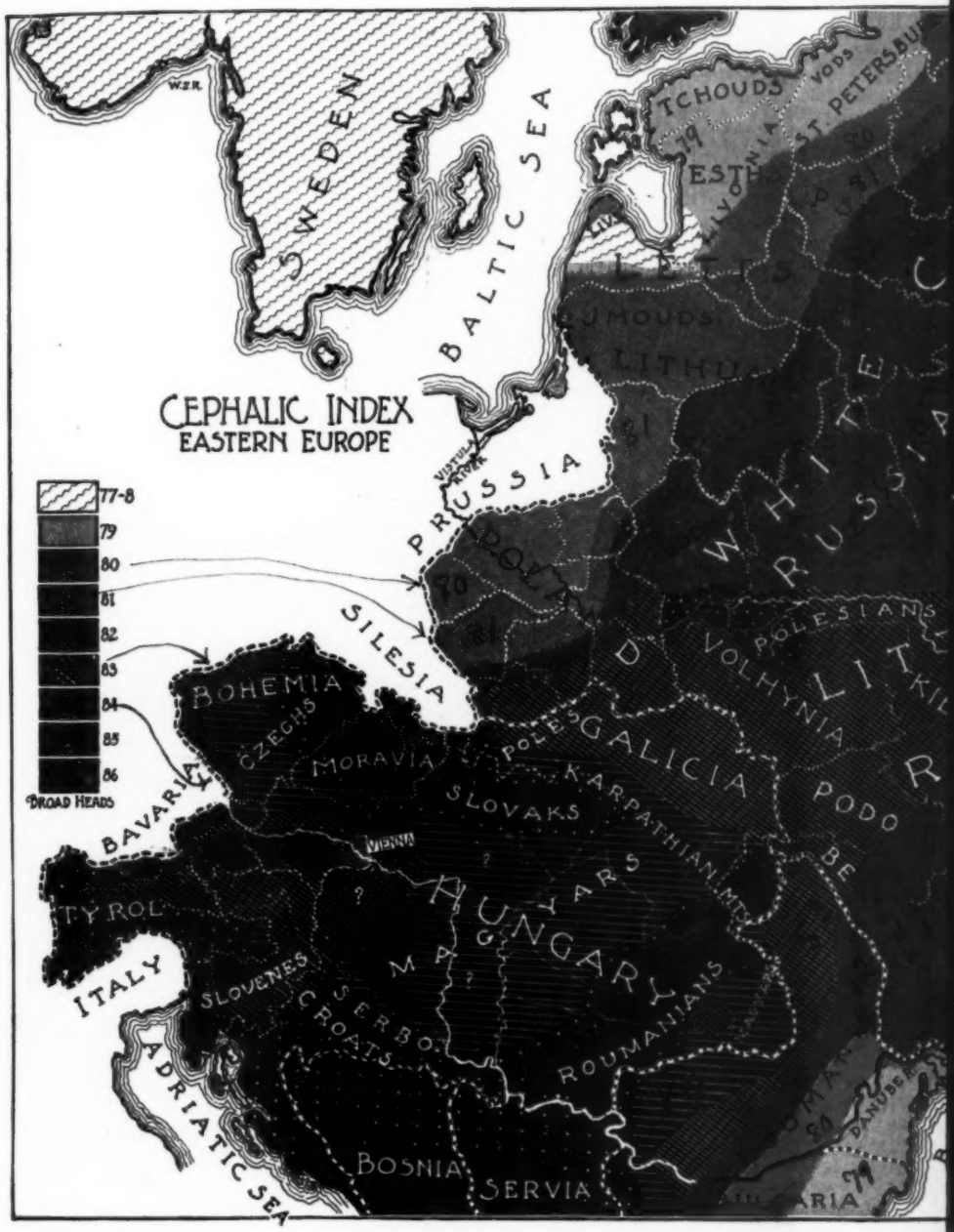
and away to the northeast. This brings us to Asia, with its terrific extremes of continental climate, with its barren steppes, its slit-eyed Mongols, and its nomadic and imperfect culture.

A word must be said, before we proceed to the physical anthropology of Russia, as to the languages which are spoken there. The true Russians form about one half the population of the European portion of the country; the rest are Letto-Lithuanians, of whom we shall speak in a moment, Poles, Jews, Finns, and Mongols, with a sprinkling of Germans. The true Russians are divided into three groups of very unequal size.* These are said to differ not only in language, but in temperament as well. About fifty of the seventy-odd millions of them, known as Great Russians, occupy the entire center, north, and east of the country. These are the "Muscovites," their historic center being in the ancient capital city of Moscow. Next in numbers come the people of Little Russia, or Ukraine, which, as our maps show, inhabits the governments of the southwest, up against Galicia. They in turn center politically in Kiev, covering a wedge-shaped territory, with its point lying to the east in Kharkov and Voronesh. The Cossacks, who extend down around the Sea of Azof into the Kuban, are linguistically Little Russians also. The third group, known as the White Russians, only four million souls in number, is found in the four governments shown on our maps, extending from Poland up and around Lithuania. This White Russian territory is flat, swampy, and heavily forested, in strong contrast to the fertile, open Black Mold belt of Little Russia. In topography and in the meagerness of its soil White Russia is akin to the sandy Baltic provinces from Lithuania north. Linguistically, the White and Great Russians are closely allied; the dialect of the Little Russians is considerably differentiated from them both. This is probably due to the Tatar invasions from the east across middle Russia. In face of these the Great Russians withdrew toward Moscow; the White Russians took refuge in their inhospitable swamps and forests, while the population of the Ukraine was left to itself at the south.

Entirely distinct from the Slavs in language is the Letto-Lithuanian people, which, to the number of three million or more, occupies the territory between the White Russians and the Baltic Sea extending down into northern Prussia.† Their speech, in the comparative isolation of this inhospitable region—an isolation which made them the last people in Europe to accept Christianity—is the most archaic member of the great Aryan or inflectional family. Standing between Slavic and Teutonic, it is more primitive than

* Rittich, 1878 b, has mapped their distribution in minute detail.

† Müschner and Virchow, 1891, have studied these Prussians.


CEPHALIC INDEX
EASTERN EUROPE
77-8
79
80
81
82
83
84
85
86
BROAD HEADS
SWEDEN
BALTIC SEA
PRUSSIA
SILESIA
BOHEMIA
CZECHS
MORAVIA
BAVARIA
TYROL
ITALY
SLOVENES
CROATS
ADRIATIC SEA
BOSNIA
SERVIA
HUNGARY
SLOVAKS
KARPATHIAN MTS
GALICIA
POLESIANS
VOLHYNIA
PODO
WHITE RUSSIA
ROUMANIANS
VIENNA
VISTULA
ESTHONIA
LITHUANIA
TCHOUDS
VODS
ST. PETERSBURG
DANUBE

BALTIC SEA
TCHOUDS
ESTH
INDEX
UROPE
PRUSSIA
SILESIA
POLESIA
VOLHYNIA
GALICIA
KARPATHIAN MTS
SLOVAKS
HUNGARY
ROUMANIANS
BOSNIA
SERVIA

VODS
T. PETERSBUR
CREAT
RUSSIA
RUSSIA
LESIANS
CHER
LE
KIEV
RUSSIA
PODO
BE
TATARS
GREEKS
BLACK SEA
DANUBE
ARIA

either. Three tribes or peoples of them coexist here: Letts, Jmouds or Samogitians, and Lithuanians proper, as shown on our map. Contact with the Finnic-speaking peoples north of them—Esths, Livs, Tchouds, and Vods—has modified the purity of the Lettic speech considerably. These Finns, in turn, speak a language like that of the Magyars in Hungary, and the Basques, which is not European at all. It is similar in structure to the primitive languages of Asia and of the aborigines of America. It represents a transitional stage of linguistic evolution, through which the Aryan family has probably passed in earlier times. But the language of the Letto-Lithuanians, while primitive in many respects, bears no relation structurally to the Finnic; it is as properly Aryan as the speech of the Slavs.

The perfect monotony and uniformity of environment of the Russian people is most clearly expressed anthropologically in their head form. Our results are shown graphically, it is believed for the first time, by the accompanying map of cephalic index. The proportions of the head, as we have sought to prove in our previous papers, are to-day regarded as perhaps the most indubitable test of racial derivation for Europe, at least. The cephalic index is merely the breadth of the head in percentage of its maximum length from front to back. Thus a cephalic index of 82 means that the head is $\frac{82}{100}$ as broad as it is long. A rise of index implies an increasingly broad or short head. Low indexes mean long heads; high ones denote a round or bullet-shaped cranium. Of course, as we must reiterate, our indexes are merely the averages for great numbers of individuals. They express more or less roughly the central type toward which the populations as a whole tends.

Bearing in mind that the Poles and Letto-Lithuanians along the Baltic Sea are not Russians properly, and excluding, of course, the Tatars of the Crimea, a moment's consideration of our map * shows at once a great similarity of head form prevailing all over Europe from the Carpathian Mountains east and north. The cephalic index oscillates but two or three points about a center of 82. This is about the head form of the northwestern French; appreciably

* Our data for this map may be found mainly in the original and excellent compilation of Niederle, 1896 a, pp. 54–57. Additional material of great value, especially from unpublished sources, is given in Deniker, 1897 and 1898 a; while his work, announced *in extenso* (1898 b), promises to give the most notable results. An especial feature will be his map of the cephalic index of Europe, prepared through the munificence of Prince Roland Bonaparte. It will be a contribution unsurpassed for comprehensiveness. We had, prior to the knowledge of these, independently collected data from the original sources, published in L'Anthropologie, vol. vii, 1896, p. 513, in part; but these later authorities agree so perfectly with our own observations, that reference to them is sufficient. We can only add certain unpublished data on the Magyars from Dr. Janko, of Buda-Pesth; Talko-Hryncewicz's (1897) recent observations in Podolia; Varobdev on the population of Great Russia; etc.

broader, that is to say, than the standard for the Anglo-Saxon peoples. In places the breadth of head in Russia increases, especially among the Polesians isolated in the marshes of Pinsk and along the swamps of the Pripet River. These people are supposed to be infused with Polish blood, which may account for it,* as the southeastern Poles are quite brachycephalic (broad-headed). At other times, as in southern Smolensk, the index falls to 80.† Our widest range of variation in Russia is about five units. Compare this with our former results for western Europe. In France, less than half the size of this portion of the Russian people covered by our map, the cephalic index runs from 78 to 88. In Germany the limits are about the same; while in Italy, only one eighteenth the size of European Russia, the head form changes from an index of 75 in Sardinia to one of 89 in the Alps of Piedmont. These are about the extremes of long- and broad-headedness presented by the human species; the Russian type is about midway btween the two.

One cause of this unparalleled extension of a uniform type, measured by the proportions of the head—a variability, notwithstanding the size of the country, only about one third of that in the restricted countries of western Europe—is not far to seek. It lies in the monotony of the Russian territory, which we have emphasized above. Once more are we confronted with an example of the close relation which exists between man and the soil on which he lives. A variety of human types is the natural accompaniment of diversity in physical environment. Intermixture and comparative purity of race may coexist side by side. Switzerland and the Tyrol offer us violent contrasts of this sort. Russia, devoid of all obstacles in the way of fusion, presents a great mean or average type, about halfway between the two limits of variation of which the European races elsewhere can boast. But pass beyond the foothills of the Caucasus, and behold the change! A Babel of languages—no less than sixty-eight dialects, in fact—and half as many physical types, of all complexions, all head forms, and all sizes. Truly it seems to be a law that mountains are generators of physical individuality, while the plains are fatal to it.

The population of Russia is not alone made up of Russians. We have in our preceding paragraph expressly excluded the population of the Baltic provinces. For the Letto-Lithuanians are not Slavs, as we have already observed, and of course the Finnic peoples, Esths,

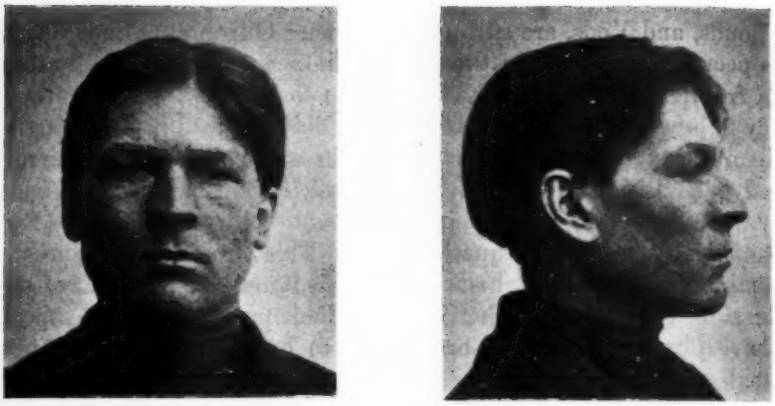
* Talko-Hryncewicz, 1894, p. 159, on the anomalous position of the Polesians. Rittich, 1878 b, divides them dialectically between White and Little Russians. Talko-Hryncewicz, 1893, p. 133, and 1894, p. 172, gives his observations on head form. The seriation points to a strong brachycephaly.

† Deniker asserts an index of 80.8 in southern Volhynia and of 86 in southern Kiev; but I am unable to confirm it by adequate data.

Tchouds, and Vods, are still more distinct. Our map at once brings the peculiar head-form of these groups into strong relief. All along the frontier of Germany, and away up to Finland, a strong tendency to long-headedness is manifested. This contrast, as it appears to the ordinary traveler, is exemplified in our portraits. A narrow head generally is accompanied by a rather long and narrow face; our Mongol types, with their very round bullet heads, are characteristically broad and squarish-faced. This is partially due to the prominence of the cheek bones. It is this latter characteristic of our American aborigines which gives them their peculiar Mongol aspect. I have observed the very broad face to be one of the most persistent traits in the cross-breeds. Dr. Boas has proved it statistically. Even a trace of Indian blood will often cause this peculiarity. Now, the Russians express their relative broad-headedness, as compared with the Letto-Lithuanians and Baltic Finns, in the relatively squarish form of their faces.* The Volga Finns, on the other hand, with more admixture of Mongol blood, are perceptibly broader faced. Our portraits make this difference apparent at once.

South and west of the Carpathian Mountains a second great division of the Slavs exists. This includes the Poles, Czechs, Slovaks, Moravians; and—divided from them by the intrusive Magyars, who speak a Finnic language—the Slovenes, Serbo-Croatians, and Bosnians in the south. This *congeries* of scattered Slavic nationalities seems to be, for some reason, politically adrift in Europe. The Bulgars and Roumanians belong to a still different class. For the former, while Slavic in speech, is quite distinct in physical derivation; and the Roumanians, in origin probably allied to the Slavs, speak a corrupted Romance language. Matters are indeed becoming mixed as we approach the Balkan Peninsula. This entire group of southwestern Slavs is characterized by a very prevalent broad-headedness, much more marked than among the Russians, as Weisbach has been proving for twenty-five years. Their brachycephaly is directly conjoined to that of the Alpine highlands in the Tyrol, where we pass beyond the limits of Slavdom, and enter the territory once occupied by the Celts. Our map points to a once universal broad-headedness over all the present Austro-Hungarian Empire, from which a spur seems to extend over into Little Russia, becoming lost in an expanse of longer-headedness in the plains beyond. All the mountainous regions are still characterized by brachycephaly; it is a repetition of the law which holds good throughout western Europe. This brachy-

* Talko-Hryncewicz, 1893, p. 169, and Majer and Kopernicky, 1885, p. 59, show the round broad face of the Poles in Galicia, as compared with the Ruthenians. The Carpathian mountaineers seem to be anomalously long-faced. (Kopernicky, 1889, p. 49.)



GREAT RUSSIAN. Vladimir Government. Cephalic Index, 84.2.

GREAT RUSSIAN. Vladimir Government. Cephalic Index, 82.

TATARS. Goursuf, southern Crimea.

SLAVIC TYPES (WITH TATARS).

cephaly is tempered only in those districts like Austria, where we know both from language and history that the Teutonic influence has been strong. Other physical traits will corroborate this deduction shortly. Yet these Austrian Germans are to-day only distantly related to the blond Scandinavian Germans along the Baltic. They resemble the Bavarians and Swabians, who are, as we know, a cross between the blond Teutonic race and a thick-set, broad-headed Alpine one. Leaving aside for the moment the long-headed strip on the Black Sea, shown by our map, we can not resist the final inference that all this part of Europe, now inhabited by the southern Slavs, is fundamentally Alpine in racial type, although eroded in places by Teutonic influences from the north, and disturbed by the volcanic irruption of the Finnic Magyars and the Turkish Bulgarians.

The word Russian is undoubtedly derived from a root meaning red. Our adjective *rufous*, and the name Ruthenian, applied to the inhabitants of Galicia, bear the same signification. The name is aptly applied, for the Russians, wherever found, are characterized by a distinct tendency toward what we would term a reddish blondness. Janczuk, in the government of Minsk, in White Russia, found almost half his peasants to have hair of this shade.* It is not a real red, however. It might be called either a light chestnut, a dark flaxen, or an auburn tint. This shade of hair, combined with what Talko-Hryncewicz terms a "beer-colored" eye, is the center from which variation up or down occurs. This range of variation is quite considerable, and seems to conform to the general law for all Europe, to which we have already called attention.† Brunetteness increases regularly from north to south. In Russia the population also manifests a distinct tendency toward darker hair and eyes from west to east. The Baltic Sea is the center of distribution for blondness, here as in Germany. The relations are well illustrated by the following table; statistics offer merely a scientific confirmation of the facts of common observation:

Percentage of Types (Hair, Eyes, and Skin combined).	476. Letto-Lithuanians.	961. White Russians.	252. Podolians.	2,619. Little Russians.	188. Ruthenian mountaineers.	22,082. Great Russians.
Blond	67	57	55	33	28	40
Mixed	28	31	29	46	32	40
Brunette	5	11	18	20	40	20

These figures show that the Letto-Lithuanians are the lightest people in the group. They are characterized most frequently by a blue eye, and light hair which rivals the Swedes and Norwegians in

* 1890 b, col. 69.

† Popular Science Monthly, vol. l, April, 1897, p. 765.

its purity.* Two thirds of these Baltic peoples appear as pure blondes. The Poles are nearly as light, apparently. Majer and Kopernicky,† in fact, found more blond types among adults even than Virchow did among his German school children, and this, too, despite the fact that the blondness of the latter would surely decrease with growth. Next to the Poles and Letto-Lithuanians come the White Russians and the people of Podolia (see map facing page 724), with still a majority of blond types. The Great Russians are somewhat darker, but even they are appreciably lighter in complexion than the little Russians in the southern governments. These Ukainians are still blue or lightish in eye, but betray a strong disposition to dark-brown hair. This latter is here as common as the light brown.‡ The "beer-colored" eye, in most frequent combination with really dark hair, brings us to the culmination of brunetteness among the Galicians in the Carpathian Mountains. These Gorali, as our table indicates, in contrast with the Letto-Lithuanians, show the clear brunette at last outweighing the blond. The name "black Russians," applied to these mountaineers to distinguish them from the Ruthenians, or "red Russians," of the plains of Galicia, appears to be deserved. They seem to contain twice as many clear brunette types as the Ukrainians, who are in Russia accounted dark. Beneath all these variations, however, underlies the rufous tendency of which we have spoken. It distinguishes the Russian blondness from that of all other Europeans.

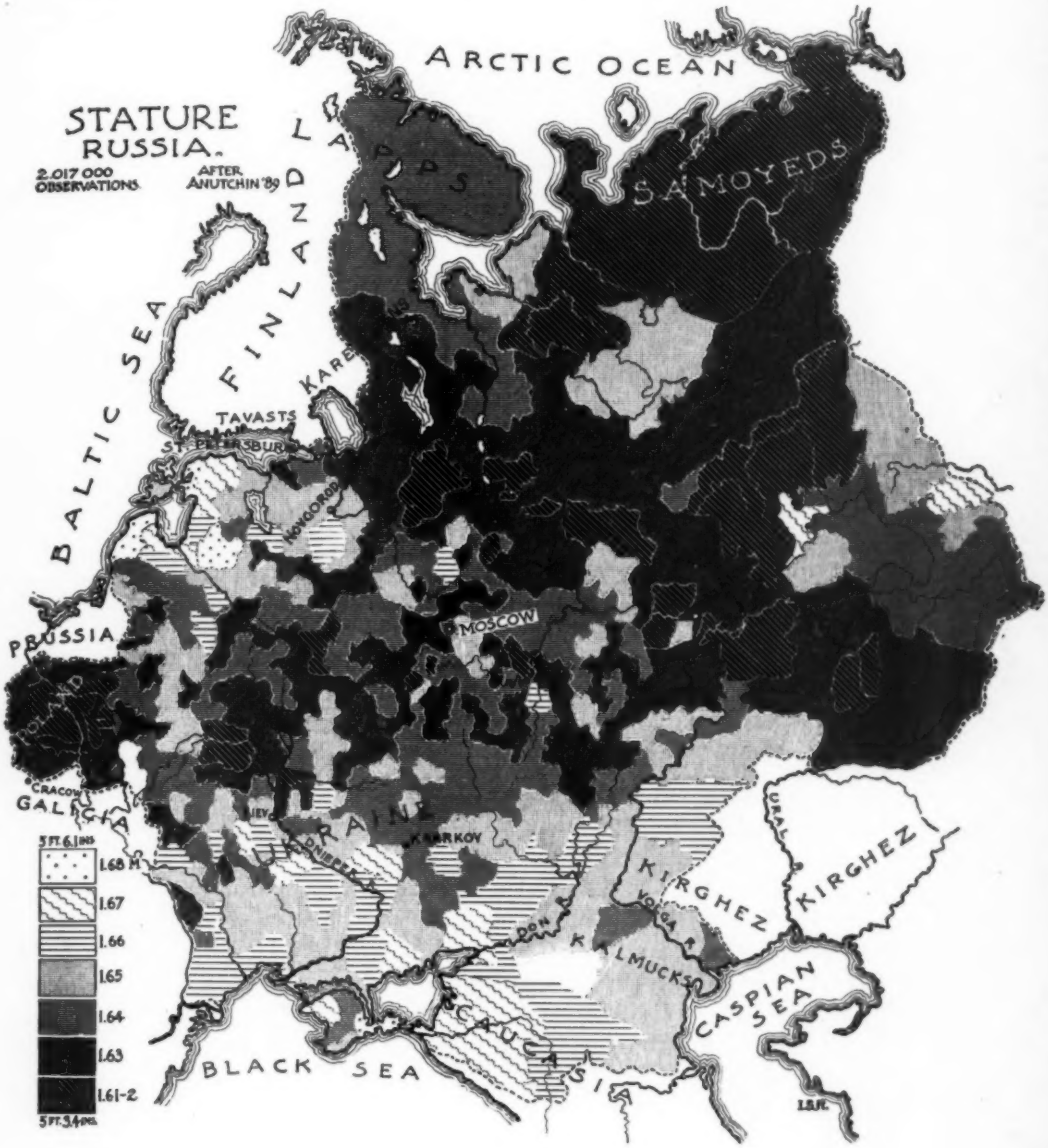
In stature the Russians are of medium height, but they betray the same susceptibility to the influences of environment as other Europeans Our map, herewith, illustrates this clearly. This investigation of upward of two million recruits, by the eminent anthropologist Anutchin, shows a considerable variation according to the fertility of the country. Thus in the northern half, above Moscow and Kazan, the adult males are two inches shorter than in the Ukraine about Kiev, which lies in the heart of the Black Mold belt. The difference between White and Little Russians is due to the same

* Talko-Hryncewicz is the only observer who has consistently applied a uniform system of observation to various localities. This table, arranged from his works of 1893, p. 112, 1894, p. 168, and 1897, p. 279, presents the best summary of his conclusions. He has covered Lithuania, White and Little Russia. We have added results from Majer and Kopernicky, 1877, p. 112, and 1885, p. 43, and Kopernicky, 1889, as to the Ruthenians and Poles in Galicia. We add, although not strictly comparable, Zograf's (1892 a, p. 165) results on the Great Russians. More definite comparisons, yielding, however, entirely parallel results, may be drawn from the color of the hair alone. Thus we may include the Poles and even the southern Slavs as far as Bulgaria. To the tables in Talko-Hryncewicz's papers may then be directly added Weisbach's observations over a large field. Niederle, 1896, pp. 60 *et seq.*, has done this most satisfactorily.

† 1877, pp. 90 and 112, and 1885, p. 34. Elkind's results (1896) also show a marked blondness.

‡ Tschubinsky, 1878, p. 364, confirms these results.

cause. Other influences besides physical environment are, however, at work, beyond question. This is especially the case in Poland. This unhappy country is the adopted fatherland of millions of Jews.



There are almost more here than in all the rest of Europe put together. These Jews are one of the most stunted peoples in Europe. In how far this is the result of centuries of oppression, and in what degree it is an inherent ethnic trait, we need not stop to consider. It

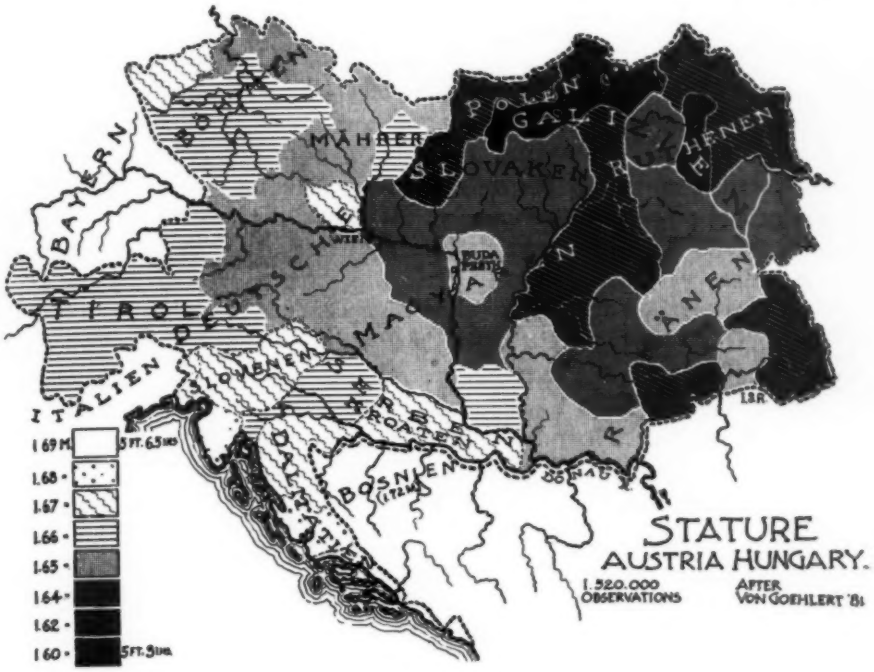
is an indisputably proved fact. The presence of this horde of Jews, in Poland often outnumbering the natives, especially in the towns, is largely accountable for the short stature shown by our map. This does not exonerate the Poles by any means from the charge of relative diminutiveness. The degree in which they are surpassed by their Slavic neighbors is shown by our map on the next page. Comparisons with Russia are facilitated by the uniformity of tints. Yet even here in Austria-Hungary the shortness of the Poles and Ruthenians, which together form the population of Galicia, may be partly attributable to the large contingent of Jews.

The clearest example of stature as an unmitigated ethnic trait, hereditary and persistent, is shown in the eastern half of Austria-Hungary, on our second map. Notice the lightness of shading among all the Germans (Deutsche) in Austria, in the Tyrol, and in the northwestern corner of Bohemia (Böhmen). These are just the districts where Teutonic infiltration from the north has been historically proved since early times. We have already mentioned it in our study of the head form. The German-speaking Austrians, then, are by nature, and not by acquisition, an inch or two taller than many of the Slavic peoples subject to their political domination. It is the same phenomenon already so familiar to us in the case of the relatively gigantic Burgundian peasantry in France to-day; in the tallness of the people of Lombardy; and, above all, in the Teutonized eastern half of the British Isles. This latter example comes directly home to us, because we in America owe a large measure of our surpassing stature to the same ethnic cause. Never has a physical trait shown so surprising a persistency as in the height of these Teutonic peoples.

Just here a difficulty confronts us—one which no anthropologist has satisfactorily explained. Our second map shows a very tall population among the southern Slavs, the Slovenes, Serbo-Croatians, and Bosnians, contrasted with the short Poles, Ruthenians, and Slovaks in the northeast. This can not historically be traced to a Teutonic ancestry. Anthropologically it is even less probable, because these southern Slavs are all very dark in hair and eye, being in this respect as in head form the polar extreme from the Teutons of the north. A distinct subcenter of giantism, inexplicable but established beyond all doubt, exists just east of the Adriatic Sea. Its influence radiates through the Slovenes over into northeastern Italy. We find indication of it in the Rhætian parts of Switzerland. Deniker, in his recent classification of the anthropological types of Europe, carries it even further, under the definite name of the Adriatic or Dinaric race.* Can it be denied that the tallness of

* 1898 a, with map. We emphasized the same fact in our general stature map of Europe in the Popular Science Monthly, li, May, 1897, p. 30.

the Tyrolese, who in their mountainous habitat, despite the depressing influence of their environment, surpass the Swiss, the Bavarians, the Austrians, and the Italians, may not possibly be due to a double ethnic source? At just this point in the Tyrol the Teutonic wave of tall stature from the north and the Adriatic one from the south come



together. Thus an exception to the law that, other things equal, the populations of mountains are unfavorably affected in stature by their environment may possibly be explained.

Turning back to our map of stature in Russia, on page 731, we observe a distinctly lighter shading—that is to say, a taller stature along the coast of the Baltic Sea. This is merged in the mediocre stature of the Great Russians, a little east of Novgorod. Although unfortunately our map does not give the data for Finland, we know that a similar superiority of stature extends all across this province. All the Finns in this part of Russia are very tall. G. Retzius, Bonsdorff, Hjelt, Eliséev, and all observers agree in this. An average

---

NOTE.—This map seems to give average statures slightly lower than those of other observers, like Weisbach, Korösi, and Janko; but, on the other hand, they are corroborated by Scheiber, Majer and Kopernicky, and Zuckerhandl. In all cases the relativity of the various districts is precisely the same; it is confirmed by the maps for the empire by Le Monnier and Myrdacz. It seems to fit perfectly the results for neighboring countries, given by Livi, Zakrezewski, and Anutchin.

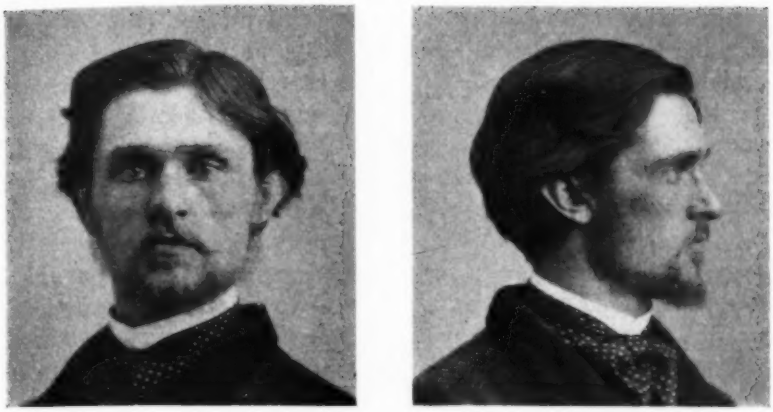
height not a whit less than that of the pure Scandinavians in Norway and Sweden is proved. It lessens toward the north in contact with the Lapps, most stunted of men at an average of only five feet for adult males. It decreases on the east among the Karelian Finns, falling rapidly to the Russian average. Bear in mind that in no other part of northern Europe, save in Scandinavia, just across the Baltic Sea, is an average stature anywhere near that of the Finns to be found; that a cross with the Swedes in consequence is inadequate as an explanation for this tallness; that wherever there is contact with the Slav, precisely as in Austria-Hungary, where, as we have seen, an ethnic trait ran up against Slavdom, the bodily height falls to mediocrity; and draw the only inference possible both from geography and physical anthropology. We shall deal with the philologists later. The Finn and the Scandinavian are at bottom of the same race.

Summarizing our results thus far, we find two physical types more or less clearly coexisting in the Russian people, and throughout all the Slavs, too, for that matter. One is tall, blondish, and long-headed; the other is brachycephalic, darker-complexioned, and of medium height. The relative proportions of each vary greatly from one region to another. Among Lithuanians and Poles, the former is more noticeable; in the Ukraine the other type becomes more frequent; the Great Russians stand between the two; while among the southern Slavs the blond, long-headed variety entirely disappears. Not only do the relative proportions of these component types vary from one region to another. Distinct differences in the several social strata of the same locality appear. The tall dolichocephalic blondes are more characteristic of the upper classes as a rule, so far as the matter has been examined.* Our results for western Europe are entirely harmonious with this tendency. And, thirdly, it is curious to note that the relative proportions of these two ethnic types have changed entirely since prehistoric times. This point is of so great significance that we must examine it a bit more in detail.

Nowhere else in Europe is the complete submergence of an old race by an intrusive one more clear than in the Slavic portion of Europe. Bogdanof, founder of Russian archæology, devoted his entire life to proof of this fact in his own country.† The first indications of this submerged aboriginal population were given by crania

* Olechnowicz, 1893, 1894, and 1897, has obtained some highly interesting results among the "petite noblesse" in Poland. Talko-Hryncewicz, 1897, confirms it, in Bull. Acad. Science, Cracow.

† The facts yielded by his first investigation in 1867 have been confirmed by every observation since. We are fortunate in that a complete summary of his life work was given by himself at the International Congress of Anthropology at Moscow in 1892. Titles of all his monographs will be found in our bibliography above mentioned.



Blond Lithuanian.

Finn. West coast, Finland. Cephalic Index, 78.

Cheremiss. Volga Finns. Mordvin.

Finno-Teutonic Types.

from the tumuli which are scattered all over Russia from the Carpathians almost to the Ural chain, and even beyond in Siberia. These Kurgans, so called, are merely large mounds of earth from twenty to fifty feet high, sometimes single, sometimes arranged in series for miles. They are not unlike the simpler relics of our own mound builders. The dead level of the country makes them in the open prairies often of great service to herdsmen in tending their flocks. These tumuli were found for the most part to date from the stone age; no implements or ornaments of metal were unearthed in them. The absence of weapons or utensils of war in the Kurgans also denoted a peaceable folk. The population must have been considerable, for these tumuli are simply innumerable. The men of this prehistoric period betrayed a notable homogeneity of type, even more uniform than that of the modern living population. The crania were almost invariably of a pure, long-headed variety; the cephalic indexes ranging as low or lower than that of the purest living Teutonic peoples to-day. Remembering that the modern Russians are well up among the moderately broad-headed Europeans, it will be seen what this discovery implied. Nothing else was known save that this extinct people were very tall, considerably above the standard of the Russian mujik to-day. The most obvious explanation, in view of the fact that Finnic place names occurred all over Russia, was that these tumuli were the remains of an extinct substratum of Finns, driven out or absorbed by the incoming Slavs. Their civilization, made known to us by Uvarof, and more recently by Inostranzef, was definitely connected with that of the Merian people, so called by the historians.

Soon a new and significant point began to be noted. While the range of this primitive long-headed people, so different from the living Russians, was distinctly set on the north and east, no definite limits could be set to it toward the southwest. In the meanwhile Kopernicky and others, from 1875 on, began to find evidence of the same dolichocephalic stratum of population, underlying all the Slavs in Podolia and Galicia.* Their track has been followed, entirely antedating the modern Slavs, down into Bohemia and Moravia, by Niederle † and Matiegka,‡ and as far as Bosnia, where, in the great discoveries at Glasinac,* the existence of this same aboriginal population was abundantly proved. On the west, Lissauer followed it across Prussia beyond the Vistula. || Thus on every side it was traced to the

* Kohn and Mehlis, 1879, give a complete *résumé* of Kopernicky's results in an excellent work which seems to be little known. See especially vol. ii, pp. 108–110, 152, 153.

† 1891 a, 1894 a, p. 277, and best of all in his masterly work of 1896 a, pp. 67–75, where he gives data for all Slavic countries in detail. His paper in French, at the Moscow Congress of 1892, gives a mere outline of the results obtained. Palliardi, 1894, deals with Moravia also. ‡ 1892 b, and 1894 a. * Glück, 1897 c, p. 575. || 1874–'78.

limits of Slavdom, and found to underlie it throughout. Two explanations were suggested for this widespread phenomenon. Bogdanof and a few others asserted that civilization implied an increased broad-headedness, that a morphological change had taken place in the same people, while the majority of anthropologists found in it proof of an entire change of race since the earliest times. The first explanation, even granting that the brachycephalic races as a rule are endowed with a greater cranial capacity than the long-headed ones, could hardly be accorded a warm reception in any of the Anglo-Saxon countries like our own. To relegate long-headedness to an inferior cultural position would result not only in damning the entire Teutonic race, but that one also which produced the early Semitic, Greek, and Roman civilizations. No explanation for the recency of broad-headedness in the Slavic countries is, then, tenable for a moment, save that the brachycephalic contingent is a newcomer in the land.

Which of these two ethnic elements which have contended so long for mastery among the people of this part of Europe represents the primitive Slavic type? It is a delicate matter, by no means free from national prejudice. The Germans have always looked down upon their eastern neighbors, by reason of their backwardness in culture. Our ignoble word "slave" is a product of this disdain in Europe of the Slav.* To find the primitive Slavic type, therefore, in that variety, which accords so completely with our pattern of the Teutonic race, is disheartening to the Germans as for the Slavs themselves; it runs counter to their distrust of modern aggressive Teutonism. Even science is not free to violate the provisions of the Triple Alliance with impunity.

The most generally accepted theory among anthropologists as to the physcal relationship of the Slavs is that they were always, as the majority of them are to-day, of the same stock as the broad-headed Alpine (Celtic) race. This latter occupies, as we have seen, all the central part of western Europe. It predominates among the north Italians, the French in Auvergne and Savoy, and the Swiss. It prevails in the Tyrol and all across southern Germany, in Alsace-Lorraine, Würtemberg, and Bavaria. The French anthropologists, especially Topinard, have emphasized the direct similarity in head form which exists between all these people and the Slavs. The name Celto-Slavic has been applied to this broad-headed race by virtue of this fact. It was a logical deduction from the first discovery of broad-headedness among the Slavs by A. Retzius, von Baer, and Weisbach. The main objection to it came from the philologists, who found the Slavic

* Consult Canon Taylor, Words and Places, p. 303, and Leroy-Beaulieu, 1893-'96, i, p. 97, on this.

languages much nearer the Teutonic than the Celtic branch. This Celto-Slavic theory, affirmed by the French anthropologists, mainly on the ground of similarity of head form, is generally sustained by the Germans on the basis of their investigations of relative brunetteness among school children.* These have all tended to show that the Slavonized portions of Germany and Austria were darker than the purely Teutonic ones.

The native anthropologists are divided in theory as to the type of their Slavic ancestors. No one pretends to question the facts in the case; the divergence of opinion is merely as to which stratum of population, which region, or which social class of the two we have described, is entitled to claim the honored title. Thus Anutchin,† Tarenetsky,‡ Talko-Hryncewicz,* Olechnowicz, || Kopernicky,△ Pic,◊ Ikof,↕ and Janczuk↕ identify the modern broad-headed population as a Slavic invader of originally Finnic territory; while Bogdanof,↕ Zograf,** and especially Niederle,†† represent the claims of the extinct Kurgan people to the honored name of Slav. Leroy-Beaulieu seems to represent a popular tendency in favor of this latter view.‡‡ For our own part, we rather incline to agree with Matiegka that it is a question which the craniologists are not competent to settle.** That the Alpine (Celtic) racial type of western Europe is the best claimant for the honor seems to us to be the most logical inference, especially in the light of studies of the living aborigines of Russia, to which we must now turn.

Three ethnic elements are generally recognized as component parts of the Russian people—the Slav, the Finn, and the Mongol-Tatar. The last two lie linguistically outside the family of related peoples which we call Aryans, the only other non-Aryan language in Europe being the Basque.|||| In any classification of them, according to their physical characteristics, we must, however, set aside all the evidences of language as untrustworthy. To admit them as a basis of classification would involve us at once in inextricable confusion.△△ These tribes have all been more or less nomadic for ages

---

* *Vide* our article on Germany in Popular Science Monthly, vol. lii, November, 1897, p. 67. Kollmann, 1882 b, and Ranke, 1886–'87, vol. ii, p. 267, dissent from it. *Cf.* Rhamm in Globus, vol. lxxi, No. 20.

† 1892, pp. 279–281. ‡ 1884, pp. 63–65. * 1893, p. 171.

|| 1893, p. 37; 1895, p. 70. △ Kohn and Mehlis, vol. ii, pp. 114, 153, and 164.

◊ Athenæum, Prague, vol. viii, p. 193. ↕ 1890, col. 103.

↕ 1890 a, col. 202. ↕ 1892, pp. 10 and 13. ** 1896, p. 63.

†† 1891 a, 1892 a, and especially in his positively brilliant 1896 a, pp. 50 *et seq.* Consult his answer to criticisms, 1891 b, and in Globus, vol. lxxi, No. 24 also. His bibliography of the subject is superb. ‡‡ 1893–'96, vol. i, pp. 96 and 108. ** 1891, p. 152.

|| *Vide* Popular Science Monthly, vol. li, September, 1897, p. 613.

△△ The errors of such a classification are well exemplified in Leroy-Beaulieu's otherwise excellent work, in which his aborigines are utterly confused in relationship. Rittich in all

in this great plain country; they have taken on and put off customs, language, and religion time and again, according to circumstances. The latter characteristic, religion, in fact, affords us a far better standard for ethnic classification than language, for the Finns have persisted in Christianity, the Turks and Tatars have held to Mohammedanism, and the Mongols proper to Buddhism, with a remarkable constancy. The varying proportions of barbarism in each group are well illustrated by this fact; for in race, as in religion, the Finns are truly indigenous to western Europe, the Tatar-Turks are Oriental, while the Mongols proper are Asiatic.

The evils incident to any linguistic classification of the aborigines in Russia are best illustrated by a comparison of the Lapps with the Livs, Eths, and Tchouds of the Baltic provinces; both groups alike speak Finnic languages; the philologists, therefore, from Castren to Mikkola, class them as alike members of a Finnic "race," along with the Magyars or Hungarians, who are also Finnic in speech. Nothing could be more absurd than to assert a community of physical origin for the three. The Magyars, among the finest representatives of a west European type, are no more like the Lapps than the Australian Bushmen; and the Baltic Finns are equally distinct. The Lapps, as our portraits illustrate, are among the broadest-headed people in the world.* Their squat faces show it. In stature they are among the shortest of the human species. Virchow's celebrated hypothesis that they are a "pathological race" seems excusable on this ground. Their hair and eyes are very dark brown, often black. Could any type of human beings be further removed from this than the Finns described to us by G. Retzius, Bonsdorff, Eliséef, or Mainof? These latter are among the tallest of men, with fair skin, flaxen or tow-colored hair, and blue eyes. Turn to our map on the next page. It shows us among the Esths, on the Baltic coast, through the Cheremisse on the Volga, and clear beyond the Ural Mountains among Ostiaks and Voguls in Siberia, a long-headedness not a whit less pronounced than throughout Teutonic Germany. The contrast of tints on our map corresponds to a radical contrast of physical type.

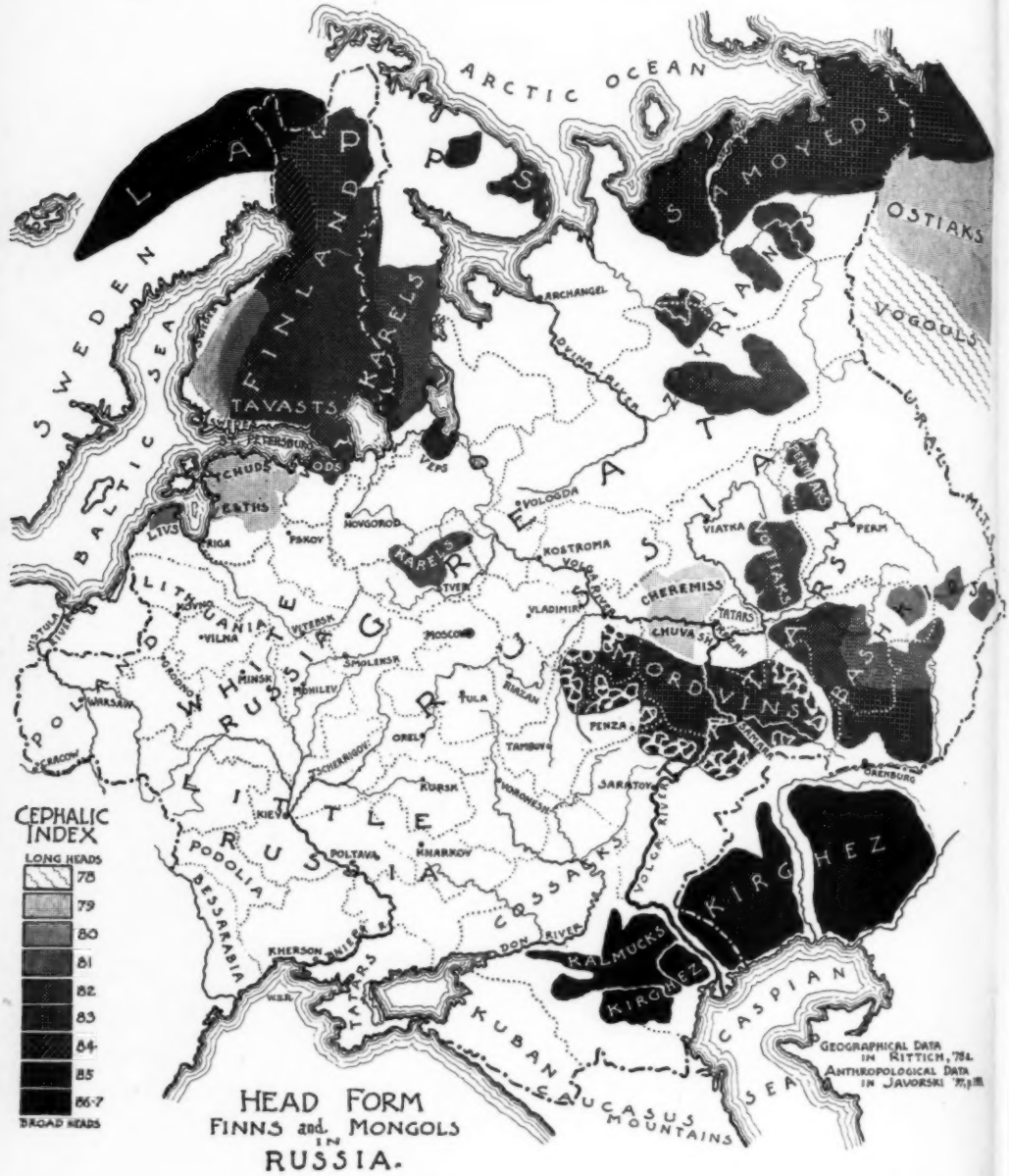
Turning to the Russian aborigines, then, with an eye single to their purely physical characteristics, we may relegate them to two groups, sharply distinguished in isolation, but intermixed along their lines of contact. Our map of cephalic index herewith will roughly

---

his work, and Keane, 1886, and in his Ethnology, 1896, pp. 303 *et seq.*, are equally at sea. Since the days of Nilsson and Prichard, the philologists have befogged the questions of physical descent. Niederle, 1896, in his appendix upon the subject, seems to be very confused. Topinard, Anthropology, p. 465, has alone avoided the prime difficulty.

* Sommier, Kelsief, Kharuzin, Garson, and others have studied them in detail.

make the division clear. Our two pages of portraits, chosen as representatives of each, will strengthen the contrast. The first group is distinctly long-headed, with an index as low as 79 or 80,



among the Livs, Esths, Cheremisse, Chouvaches, and Vogul-Ostiaks in Siberia. These are all more or less clearly blond, with a distinctly rufous tendency, even among the extreme eastern tribes of

Voguls and Ostiaks.* Sometimes, as among the Votiaks, whom Dr. Beddoe † inclines to identify with the Budini of the Greeks, because of their red hair, we find this trait very marked, especially in the beard. It seems to be somewhat less pronounced along the Baltic, where the Livs, Esths, and Tschouds shade off imperceptibly into the pure blond Letto-Lithuanians. Here we discover the source of that peculiar reddish blondness of the modern Russians of which we have spoken, for a widespread admixture of blood in the Slav from this stock is recognized by all. In this first type we recognize the Finn, using the linguistic term guardedly, with the express reservation that not every tribe of Finnic speech is of this racial ancestry.

Our second physical type of the Russian aborigines is the polar extreme from this long-headed, red-blond one. We may follow it on our map by the black tints, indicating a prevalent broad-headedness. This is best exemplified at the two extremes of Russia, in the Lapp at the northwest and the Kalmuck and Kirghez hordes of the Caspian steppes. The Samoyeds are merely a continuation of the Lapp type toward Asia along the Arctic coast. These people correspond closely to what we popularly regard as Mongolian. They are all dark or black haired, with swarthy skins; they are peculiarly beardless. With the round face corresponding to the bullet head, high cheek bones, squint eyes, and lank hair, they constitute an unmistakable type.‡ We may provisionally call it Mongol for want of a better word, but it must not be confused with the Turk or Tatar, which is quite distinct. Across middle Russia, and above all among the Bashkirs, we discover a variety of mongrels, compounded of Finn and Mongol, with a strong infusion of Tatars through the whole. Kazan, at the elbow of the Volga, is truly a meeting place of the tribes. The intermingling of strains of blood, of religions, customs, and of linguistic stocks may be observed here at a maximum. Especially where, like the Mordvins, widely disseminated in little groups, not aggregated in solid communities, as among Cheremisse or Tchouvaches, has the infusion of Tatar traits taken place. An interesting fact in this ethnic intermixture is the extreme insidiousness of the Mongolian features. This is a fertile source of confusion of the Finnic and the Asiatic tribes. Many long-headed red-blondes, as among the Ostiaks and Zyrians, who are surely Finnic at bottom, superficially resemble the Mongols in cast of countenance. We have explained, however, in the case of the Basques, how unreliable these facial features are a test of physical descent, for, being distinctive and noticeable, they are immediately subject to the disturbing influences of artificial selection.

* Sommier, 1888, p. 246; 1887, p. 104. † 1893, p. 42.

‡ Ivanovsky is the best authority on these people.

They may thus wander far from their original type, becoming part of the local ideal of physical beauty prevalent among a primitive people. Only in this way can we explain the almond eyes, flat noses, and high cheek bones of tribes which by their blondness and head form betray unmistakably a Finnic descent.

One objection to our ascription of the name Finn to a long-headed type is bound to arise. We must meet it squarely. If the Finns are of this stock, why is all Finland relatively so broad-headed as our map makes it appear? Here is the largest single aggregation of Finnic-speaking people; ought we not to judge of the original type from their characteristics in this region? By no means, for Finland is the refuge of a great body of aborigines driven forth from Great Russia by the advent of the Slavs, just as also all along the isolated peninsulas of the Baltic and in the Valdai Hills north of Tver. But in Finland, in contradistinction to these other places of refuge, the Finns were crowded in together against the Lapps. Especially in the north we see clear evidence of intermixture. The Russian Lapps are very much less broad-headed than their pure Scandinavian fellows, by reason of such a cross.* Can we deny, contrariwise, that a similar rise of index in the case of the Finns must have ensued for the same reason? The Karels, further removed from the Lapps, are somewhat longer-headed; the Baltic Finns, being quite free from their influence, are much more so. Moreover, all along the southwest coast of Finland the heads are much longer. Observations upon twenty-eight Finns in the lumber camps of Michigan by my friend Mr. David L. Wing, yielded an average index of only 78.9, while thirty-nine Swedes were two units lower. A portrait of one of these Finns will be found on our page of Finnic types. Granting that the infusion of Swedish blood all along this coast must be reckoned as a factor, a distinct tendency to this long-headedness among the Finns appears. Coupled with the long-headedness of the Cheremisse, Vogul-Ostiaks, and others, and especially the tendency of the mongrel Bashkirs to dolichocephaly as we leave the Caspian Mongol influence and approach the Ural Mountains, our affirmation of an original long-headedness of this type seems to be justified.

If our original Finns are proved to be long-headed blondes, oftentimes very tall; if the Letto-Lithuanians, contrasted with the Russian Slavs, betray the same physical tendencies; if, just across the Baltic Sea, the main center of this peculiar racial combination is surely located in Scandinavia; and, finally, if in every direction from the Baltic Sea, whether east across Russia or south into Germany, these traits vanish into the broader-headed, darker-complexioned, medium-statured, and stocky Alpine (Slavo-Celtic?) type: how can we longer

* Kelsief, 1886, and Kharuzin, 1890 b.

Lapp, Scandinavia.
Cephalic Index, 94.

Samoyed, Arctic Coast.
Cephalic Index, 87.

Kirghez, Horde of Bukee.

Kalmuck. Cephalic Index, 86.

Kalmuck. Cephalic Index, 79.

Mongol Types.

deny that Finns, Letto-Lithuanians, and Teutons are all offshoots of the same trunk? A direct physical relationship between the three, referring them all to a so-called nordic race, is confirmed by the very latest and most competent authority;* and this in absolute independence of our own conclusions.

If it be established by further investigation, our theory goes far to simplify the entire problem of the physical anthropology of Europe. It is not a new idea. Europeaus advanced it twenty years ago on the basis of the then recent archæological discoveries of a long-headed, tall race in the tumuli of the stone age, but it never gained any acceptance at the time. A curious corollary of this theory is that De Quatrefages and Virchow, in their celebrated international controversy over the origin of the Prussians, were both partly in the right. Virchow resented the view of a Finnic origin of his people as an insult, because Lapps and Finns were then confused with one another, and he certainly was right in denying any affinity of Prussians with Lapps. De Quatrefages, in asserting that the Prussians were of Finnic ancestry, was equally in the right, if our theory be true; but he erred in supposing that this damned them as non-Teutonic. For us the Prussians, along with the Hanoverians and Scandinavians, are all at bottom Finnic. We would not stop here. We would agree absolutely with Europeaus in his further hypothesis—that these Finns of northern Europe are directly related with that primitive Mediterranean long-headed stock, sprung from the same root as the negro, which we have shown to underlie all the other races of Europe.† Its blondness is an acquired characteristic, due to the combined influences of climate and artificial or natural selection. From this center in the north, invigorated by the conditions of its habitat, and speedily pressing upon the meager subsistence afforded by Nature, this race has once again during the historic period retraced its steps far to the south, appearing among the other peoples of Europe as the politically dominant Teutonic race.

The anthropological history of northeastern Europe is now clear. The Slavs penetrated Russia from the southwest, where they were physically an offshoot from the great Alpine race of central Europe. In so doing they forced a way in over a people primitive in culture,

---

* Consult Deniker's map of the Races of Europe, 1898 a, in L'Anthropologie, vol. ix, p. 129. Talko-Hryncewicz, 1893, p. 170, emphasizes the similarity of Letto-Lithuanians and Finns. Kohn and Mehlis, vol. ii, pp. 108 and 153, acknowledge the similarity of Kopernicky's Kurgan people and the Teutonic Reihengräber, as does Bogdanof, 1892, pp. 19–21, also.

† The Aryan Question, Popular Science Monthly, vol. lii, January, 1898, pp. 309 *et seq.* This is in perfect accord with Sergis's most recent work in Centralblatt für Anthropologie, 1898, p. 2; and with Niederle's conclusions (1896, p. 131; and especially in Globus, vol. lxxi, No. 24).

language, and physical type. This aboriginal substratum is represented to-day by the Finns, now scarcely to be found in purity, pushed aside into the nooks and corners by an intrusive people, possessed of a higher culture acquired in central Europe. Yet the Finn has not become extinct. His blood still flows in Russian veins, most notably in the Great and White Russian tribes. The former, in colonizing the great plain, has also been obliged to contend with the Asiatic barbarians pressing in from the east. Yet the impress of the Mongol-Tatar upon the physical type of the Great Russian, which constitutes the major part of the nation, has been relatively slight. For instead of amalgamation or absorption, as with the Finn, elimination, or what Leroy-Beaulieu calls "secretion," has taken place in the case of the Mongol hordes. They still remain intact in the steppes about the Caspian; the Tatars are banished to the eastern governments as well, save for those in the Crimea. The Asiatic influence has probably been more strong in determining the Great Russian character than the physical type. A struggle for mastery of eastern Europe with the barbarians has perhaps made the Great Russian more aggressive; vigor has developed at the expense of refinement. The result has been to generate a type well fitted to perform the arduous task of protecting the marches of Europe against barbarian onslaught, and also capable at the same time of forcefully extending European culture over the aborigines of the neighboring continent of Asia.

M. ADHEMAR LECLÈRE relates of the King of Cambodia, as illustrating one of the superstitions dominant in the country, that a French trader had a fowling piece of remarkable accuracy, which he valued very highly. The king wanted to buy it, but the trader did not care to sell. The king then said he would have a bottle enchanted by his sorcerer, which the man should shoot at. If he missed it, the king would take the gun and pay for it. If he hit it, the king would pay for the gun and the man might keep it. The offer was accepted; the bottle was enchanted and hung up at a distance of a hundred and sixty feet. The king and his sorcerer were satisfied that the man could not hit it; but it flew to pieces at the first shot. The king was very angry at his sorcerer, who fled for home as ashamed of himself "as a fox captured by a hen."

THE highest flight of kites made at Blue Hill Meteorological Observatory in 1897 was on October 15th, when the meteorograph was raised to a height of 3,571 metres, or about 11,600 feet above sea level, while the highest kite rose more than 120 feet above this. About 20,475 feet of line were used, and the pull, when the line was in the air, varied between 123 and 128 pounds. At the highest point reached the temperature was 41° F., while at the observatory it was 70° F. An interesting feature of this flight was the passage of the meteorograph through the cumulus and alto-cumulus levels of the clouds, as shown by the increase followed by a decrease of humidity at heights corresponding with those occupied by such clouds.

THE EVOLUTION OF HIGH WAGES FROM LOW COST OF LABOR.*

By EDWARD ATKINSON.

IN dealing with this subject I shall not submit many statistics. For data sustaining this thesis reference may be made to my own published works notably to the Distribution of Products: yet more to the Senate Report on Prices and Wages for Fifty-two Years, compiled by Commissioner Wright. The figures give conclusive proof that in every branch of industry, especially in all the arts which have been most fully developed by the application of science and invention, there has been a progressive advance in the rate of wages or in the earnings of all who are occupied on the farm, on the railway, in the factory, or in the workshop. This advance has been subject to temporary reductions during periods of commercial crises, usually very moderate. In such periods there is apt to be unemployment for a portion of the working force rather than any considerable reduction in established rates of wages. These periods are usually of short duration and from each small decline wages have taken a speedy upward trend. This advance in all rates of wages has been coupled with a general decline in the prices of nearly all products. In some branches of industry the advance in the rate of wages has been less than in others. When each of these cases is dealt with, usually one of two causes will be found. In many arts the progress of invention has lessened the demand for individual skill and aptitude in the workman. For instance in the making of a steel plow a few years since nearly all the workmen were of necessity skilled mechanics, earning relatively very high wages, yet such has been the application of machinery to the production of the plow that laborers may be called in from the adjacent fields who, if possessed of ordinary intelligence, may in three months or less become expert attendants upon the machines on which the separate parts that constitute the plow are made. Their wages are now as high as those of the skilled mechanics of a former generation, while the men of the present generation who correspond to the skilled plow makers of a former day have gone up into employments requiring even a higher type of individuality at higher relative rates of wages.

The same rule may be observed in the textile factory. It has often been remarked that there seemed to be a deterioration in the quality of the factory operatives at the present time as compared to

* Read before Section I of the American Association for the Advancement of Science, Tuesday, August 23, 1898.

those who found good employment in textile factories in the ante-war period. In point of fact, the women of native birth who were then so numerous in the textile factories have advanced into employments which are better paid, less arduous and of a more individual quality. Their successors, largely French Canadians, who have taken their places in the factory, might not have been able to operate the machinery of a former day for lack of the individual qualities then called for. The mechanism is now more automatic than ever before. Consequently, those who do the work may be of less intelligence, yet their wages or earnings are now twice as much per day, more than double per hour, as compared to the American factory operatives of a generation since.

Again, the prices of the goods have been much reduced. In the grades of work which still require individual skill and aptitude in directing machinery of the highest type, the competition of employers to secure the services of the workmen of highest skill has advanced their rates of wages in some cases in excessive measure. Thus it happens that while during the last fifty years all wages have advanced, even the earnings of common laborers, there is a greater disparity in the rates at the present time than there ever was before. In this same period, while prices have been reduced, the margin of profits on each unit of product has been diminished yet more; the exceptions being only those products in which the supply of the crude material has been diminished in ratio to the increasing demand. This exception applies especially to the products of the forest.

We therefore find existing conditions to be, in fact, low relative prices, high relative wages, coupled with a lessened margin of profits in ratio to our total product as compared to each decade of the last fifty years. But, on the other hand, our aggregate product has been so vastly increased that even at the lessened margin on each unit the aggregate of profits is greater than ever before. The rich have become richer. The people of moderate fortunes have become much more numerous. The condition of the large proportion of those who do the manual and the mechanical work is better than ever before; and lastly, the submerged tenth are still poor in the ordinary sense in which the word is used, not from any fault in society, but because their own individual capacity has not been developed as rapidly as the opportunity which is offered them. There is probably a less relative demand for mere common and unintelligent labor than ever before. Such poor we shall always have with us and how to deal with that element in every population is not the purpose of this essay. I merely submit the fact that in the economic records of this country, which has enjoyed a continental system of absolute free trade among a greater number of persons spread over a wider area than

ever enjoyed commerce free from restrictions before, there is a full and complete justification of the axiom of Frédéric Bastiat: "In proportion to the increase of capital, the absolute share (of a given product) falling to capital is augmented, but the relative share is diminished; on the other hand, the share falling to labor is increased both absolutely and relatively." We witness decade by decade increased production, lessened prices, higher wages, lessened cost of labor.

In addressing this association I may therefore venture to deal with deeper principles than those which govern the mere compilation of statistics.

It is but a year over a century since Malthus published his treatise upon population, in which he formulated what he believed to be a rule—namely, a tendency of population to increase in a geometrical ratio, while, as he believed, the means of subsistence could only increase in an arithmetical ratio. On this alleged tendency of population to outgrow the means of subsistence he based a rule which has since been called a survival of the fittest. He regarded the destructive influences of war, pestilence, and famine as necessary elements in limiting population to the possibility of subsistence. This theory of Malthus later became joined to a theory of a lessened production of food on given areas of land in ratio to the work done upon it, which I believe originated with Ricardo. These two pessimistic conceptions rightly brought upon political economy the name of the dismal science. Subsequently, and in recent years, both Darwin and Wallace have stated that they derived the theory of a natural selection or a survival of the fittest from the treatise of Malthus, which gave to each of them a direction in their study of natural forces which led in the end to their great work in establishing the principle of evolution. It would be presumptuous on the part of any member of one of the unlearned professions to pass judgment upon this theory in its application to animal life viewed wholly on the physical side. Yet, while we must admit that the experience of a century does not suffice either to prove or to disprove any such far-reaching proposition as that of Malthus, we may rightly ask if it is not true that if there were a tendency of population to outgrow the means of subsistence, that tendency could not fail to have disclosed itself even within the short period of a hundred years. The fact that there has been no such tendency has an important bearing on the right definition of survival of the fittest.

All hypotheses must in the end be tested by the logic of facts and by the common sense of the community regarded as a whole. No theory survives which is not true and complete in all its bearings. Whether or not the theory of evolution as it is now stated is com-

plete may rightly be questioned even by the unscientific mind. Have its advocates taken cognizance of the human will and of the reason of mankind acting under its direction as the prime factors in the production and distribution of the material subjects—food, shelter, and clothing—on which material existence depends? If it may be rightly held that such a tendency as that which Malthus thought he had proved had any real foundation, it would have been disclosed during the nineteenth century. It has not been. There has not been a single decade in the nineteenth century in which the means of subsistence have not gained rapidly on the population of the globe. The tendency throughout the century has been to abate the dangers and evils of famine, to distribute an increasing abundance of food over wider and wider areas at a lessened cost, to mitigate the horrors of war, and to develop sanitary science. If the theory of Malthus is well grounded, then it follows that the whole of the so-called progress developed in the nineteenth century has been worse than useless. It has been merely increasing the numbers who must ultimately be subjected to the horrors of war, pestilence, and famine, in order that mankind may survive upon the face of the earth. This tendency to increase of relative product has been accompanied by an enormous increase in the capital of the world—that is to say, in the products of labor saved for future reproductive service—and this vast relative increase of capital has tended to a great reduction in the normal rate of interest earned in its safe use. The improvements in sanitary science have also led to a very considerable prolongation in the lives of the intelligent. It is probable that the great life-insurance companies have only been saved from the disaster which might have ensued from the rapid reduction of the safe rates of interest on their investments by this fact that life has been prolonged considerably beyond any of the life tables which are made use of in computing the annual premiums. These gains have not been made by means of the frequent wars of the century, but in spite of them. The effect of war has been to devastate sections of important countries, and to diminish production more than it lessened population. The effect of the conscription of the strongest and healthiest of the men has led to their destruction in great numbers, and to the survival only of the less capable and less fit to reproduce the species. There has even been a distinct deterioration in the size, weight, and physical energies of the population even of great countries like France; yet in spite of these evil influences the population of continental Europe has steadily increased. The application of science and invention has enabled the debt and army ridden countries of Europe—France, Germany, Austria, Italy, and Russia—to improve their general conditions, and, although these evil influences have kept the great mass

of the people poor and in some countries on the edge of starvation, yet they have only retarded material progress without in any instance stopping it. Among the English-speaking people of Great Britain and her colonies, and the United States, and in the industrious and less warlike countries of Europe—Holland, Belgium, and Switzerland—there has been a steady gain in virility, in stature, in physical condition, and in mental skill and aptitude. In some of the eastern countries of Europe but lately redeemed from the devastating rule of Turkey, the present improved conditions are in more striking contrast with those which prevailed at the beginning of the century.

What, then, is wanting in the logic of the Malthusian conception of the survival of the fittest adopted by Darwin and Wallace? May it not be held that it is only incomplete, being limited to dealing with man as an animal, without giving regard to that prime quality of man by which he is separated distinctly from every other animal in being endowed with progressive desires and with the capacity to provide for his increasing wants?

In an address which I had the honor of making to the graduating class of the State University of South Carolina, June 26, 1889, under the title of Consumption Limited, Production Unlimited, I presented this case in the following terms:

"I have ventured, therefore, to say that on the basis of the statistics compiled in recent years it may soon be proved to be a rule or law of life that the power of man to consume the means of subsistence is limited, while, on the other hand, the power of mankind to produce and distribute the means of subsistence is practically unlimited.

"I have frequently ventured in conversation to try this hypothesis upon different people, and the very surprise with which it has been usually received goes to prove that the theory of Malthus has unconsciously governed the thought of a very large proportion of the thinking people even of this country.

"In support of this rather startling proposition, it may be suitable to point out again that material life is itself only a conversion of material forces into a new form. Man is the only animal that accumulates experience and thereby attains the power to give a new direction of a permanent kind to these forces of Nature; he therefore frees himself from subjection to the law of the survival, either of the strongest, the most subtle, or the most cunning; he attains the power to exist and multiply by dominating the forces of Nature, thereby increasing production and he makes progress by exchanging services with his kindred. Under these conditions the survival of the intelligent and the capable in increasing numbers becomes assured, because they are the fittest to survive."

I will now attempt to deal with the well-intentioned but very malignant dogma of Malthus, and also with the yet more important and admitted truths presented by Darwin and Wallace, from the point of view of an idealist. I know not how else to discriminate between one who holds the views which I shall attempt to present and one who regards man and his functions purely as a materialist giving regard to physical influences only.

So far as I comprehend the propositions submitted by either of these great leaders in scientific thought, their theories are all based upon the material conditions which govern man considered as one of the animals. If we deal with the existence of animal life as a stage in the conversion of forces by which the universe exists, we may fully admit that the animal is dominated by the forces of Nature. There may have been a development of species perhaps from a single germ. There has been a survival of one species of animal while others disappear. There has been an adaptation of animal life to the varying conditions of climate and soil in the long geologic ages. There has been a survival of the physically strongest of particular species. There has been a survival of the more intelligent species. Yet there is no evidence of the progressive development of intelligence or of experience in any existing species of animal except mankind. The dams built by the beavers in the far Northwest, of which Professor Agassiz computed the age at nearly two thousand years, as I remember, by the growth of the peat bogs that had gradually filled the lakes which the beavers created, were made in the same way that the beavers build their dams at the present time. There has been no variation, no progress. The beaver of the present generation to all intents and purposes corresponds to the beaver of two thousand years ago. True, the students of natural history have proved slight variations, slight adaptations and slight modifications in specific groups of animals, but as yet the one distinction remains which separates man from all other animals. None but men are endowed with progressive wants and with the mental capacity to secure their supply.

If it is held, as some naturalists may allege, that this statement is too strong, it may be admitted that there has also been a survival of species and of members of species whose brain measurement is to-day larger than in former periods which come within observation, and that there has been an increase of intelligence as distinguished from instinct. There are also members of particular species like beavers, who under certain conditions develop the power to build dams, and who under other conditions have not developed that power. Yet the fact remains that these slight variations, occurring in periods of almost geologic time, have no correspondence with the progress of mankind.

No other animal has yet developed the powers of reflection, forecast, and imagination, which not only create new wants among men, but which also develop the powers by means of which these wants can be supplied. All other animals are dominated by the physical forces of Nature. Man alone dominates these forces, giving them a new direction, tending constantly to the increase of the means of subsistence at a much more rapid rate than the increase of the population.

For untold ages the wind-swept prairies of the great Mississippi Valley had served to nourish a few millions of bisons which, ranging from north to south and grazing as they went, maintained a certain proportion of animal life to the means of subsistence, while a small number of Indians warring among themselves and showing no signs of progressive development sparsely occupied what is now the granary of the world. Presently came upon the scene men who had learned how to direct the forces of iron, steel, and steam. All the material conditions were changed under the power of the directing mind of man. From that valley are distributed the means of subsistence without which even in the present year disastrous famines would have devastated Europe. No man yet knows or can measure the potential or the productive energy of a single acre of land anywhere in ratio to the labor put upon it. We stand at the very beginning of progress in scientific agriculture, leading to lessened labor and increased product.

In the mind of Malthus and of Ricardo land appears to have been regarded as a mine subject like mines of metal to exhaustion. We are but beginning to learn that land is but an instrument or a laboratory responding in its products to the minimum of labor and the maximum of intelligence.

In order that we may fully comprehend the true nature and source of the increased production of the means of subsistence throughout the centuries, we must give regard to the relative insignificance of accumulated capital as compared to mental capital or experience. Material wealth counts but little as compared to mental capital. I have often had occasion to refer to the fact that the richest and most prosperous state in the world may possibly accumulate capital to the measure of three or possibly four years of production. Several years since I made a very accurate measure of the total valuation of all the mills, works, railroads, dwelling houses, goods and wares, tools and implements of the Commonwealth of Massachusetts, standing for the savings in a concrete or material form of more than two centuries of progress. They did not then equal the measure of three years' consumption. That which is the wealth of one generation is destroyed by the inventor who substitutes better mechanism for purposes of production and distribution. The entire profit

of one generation, even of one decade, consists in what had been wasted in the previous decade. We are always within less than a year of starvation, yet never before did we possess such absolute assurance of abundant consumption.

I never happened to read Disraeli's strange novels until the present summer. While I was thinking of what I had to say in this matter I came across a paragraph which seems to me to cover much the same ground over which I have been led by my observations of the hard facts of a long business life. "Man is not the creature of circumstances. Circumstances are the creatures of men. We are free agents, and man is more powerful than matter." This is another way of saying that man dominates the forces of Nature, and is not dominated by them.

Does not this same conception pervade the Hebrew Scriptures? Under the name of Moses it is written of mankind "to be fruitful and multiply and replenish the earth and subdue it, and have dominion over the fish of the sea and over the fowl of the air and over every living thing that moveth upon the earth." Do we not find throughout the Scripture record of the Jewish history the same conception of the unity of the creative mind named by the Hebrew Jehovah, by the Christian named God? Do we not find in the Hebrew theory of the origin of species the sense of order and uniformity? Is not mankind a part of that universe, and have we not the right to believe that to man by the power of will and reason, of forecast and imagination, has been given such dominion over the forces of Nature as to enable him to direct these forces to conditions of progressive welfare the scope and end of which no one can even yet measure? Each of these great investigators whom I have named in his day and generation has served to promote the very progress with which his own conceptions seemed to be most at variance.

The prime object which Malthus had in view was to overcome the evils of the then existing poor laws of Great Britain, which he accomplished. The theory of evolution is held by the masters of science to have given the greatest incentive to movement and progress yet recorded in the history of scientific research. Yet it may not be complete. In almost the same year in which Malthus presented his malignant theory, justifying war, pestilence, and famine as necessary factors in the life of man, Immanuel Kant published his great essay on Eternal Peace, resting its certainty on the development of commerce and on the mutual services which men render each other in spite of the interruptions of war, and in spite also of the evil conception of the functions of commerce which has so long pervaded the legislation of this country, from which we have yet to emerge—namely, that the import of the goods of foreign origin

which we procure in exchange for the domestic products is an industrial war upon domestic industry.

This leads me back to the thesis which gives the title to this paper. We are now exporting goods and wares of every type, from the crudest product of the field to the highest finished product of the metal works. Our supremacy over nearly every other nation, if not all, in the low cost of production of the crude materials which enter into these exports, our very low rate of national taxation, and our other advantages are conducive to this power of service which we render to other nations. Yet in this service the highest rates of wages are earned by our own workmen that are secured in any part of the world, ranging from twenty-five per cent to one hundred per cent above the rates of wages in the manufacturing countries with which we compete, and even tenfold the earnings in the nonmachine-using nations from which we procure the larger part of our imports. If the rate of wages governed our cost of production by the unit of product, not one dollar's worth of any of these goods would be sent out from our harbors. In this friendly contest to serve other nations for mutual benefit, the survival of the fittest will fall to that nation which maintains peace, order, and industry, and which removes all legal or artificial obstructions to commerce such as now exist in the fines that we impose on foreign goods under the name of protection, and in the obstructive provisions of our navigation laws whereby we are deprived of the paramount position upon the sea to which we are entitled.

It may have seemed as if I had been led wholly away from the subject which is the title of this paper in this somewhat presumptuous suggestion that the theory of evolution as represented by Darwin and his followers is totally inadequate in its application to the metaphysics of production and consumption or of trade and commerce. If the dogma of Malthus had been true in its application to the present century, and if the survival of the fittest based by Darwin upon the theory of a purely physical natural selection had been complete, the retrogression of the century would have been marked by deficiency of product, higher prices, lessening wages, larger relative profits, and increasing want. The trial balance of the more important countries and states of the world which are to be found in their statistical abstracts prove the reverse of all these necessary conclusions which must be derived from the erroneous or incomplete observations of the great investigators whom I have named. I trust, therefore, that the conclusions to which I have brought you may justify the title of my essay.

The real wage which is the incentive to work is the enjoyment of the necessaries, comforts, and luxuries of life—food, fuel, shelter,

and clothing—that is to say, the necessaries and comforts of material existence. In the fact that the wages or earnings have risen while prices have fallen, and that those who do the physical work of production have secured decade by decade an increasing share of a constantly increasing product by the expenditure of their earnings when converted into terms of money, is to be found the disproof of the Malthusian theory so far as it may be disproved in a single century. In these facts is also to be found the necessity for the metaphysical treatment of the theory of evolution as yet only partially developed by Darwin, Wallace, and their successors.

One may even venture to cite the singular vagaries of Wallace in the matter of spiritualism in evidence of a lack of the faculty of observation in metaphysics on the part of a man who has been so eminent in his observations of purely physical conditions. May not Darwin's loss of enjoyment in music and art after his long application to the observations of Nature possibly indicate a tendency to one-sided development even in the mind of a man so supremely able? Men of far less ability often realize the loss in their power of enjoyment of the functions of the ideal after overmuch devotion to the study of material conditions. This is one of the dangers in dealing with statistics, yet the imagination is an absolutely necessary factor in statistical science. The mere compiler of figures, without comprehension of the subjects of which they are symbols and without capacity to read between the columns, is a mere drudge whose work always needs to be revised and often changed in the relation of all its parts, lest false impressions should be derived from figures which are themselves true. The statistics of a nation are but the trial balance of its accounts, corresponding to the balance sheet of a merchant. Nations may be betrayed by bad bookkeeping, as merchants often are.

It is also a matter of common observation that the man who devotes himself exclusively to the accumulation of wealth loses the very power of enjoyment which might ensue from its possession had he rightly comprehended his own function in the universe.

The mathematics and statistics of the astronomer disclose the order and unity which prevail throughout the universe. Universe itself is a synonym for unity. In my own mind it seems possible to predicate order and unity in the progress of mankind in material welfare on the simple ground that man is a part of the universe. The same creative mind or power by which the world is kept upon its way from an unknown beginning to an equally unknown ending (if there can be beginning or end in an eternal order) directs all the forces of creation of which mankind is a part. It seems to me that the man who comprehends that he himself is a unit and a factor

in this great order of creation must find in the revelation of that reason and will by which he is differentiated from all other animals an emanation or inspiration from that higher power which makes for righteousness:

> "High over space and time it rides,
> The high thought that can never alter."

Again, we find in the Hebrew myth the origin of the knowledge of good and evil which has been so fearfully misconstrued in the Christian dogma as the fall of man, the first recorded conception of the development of that mental energy by which mankind became differentiated from all other animals. We also find in the true rendering of the Greek text of the central precept of Christianity—in which, as I am assured by scholars, the word "*agapao*" is more correctly construed in English in the word "service," "Thou shalt serve thy neighbor as thyself"—the very principle of modern commerce by which it lives and moves and has its being, evolving mutuality of benefits through the exchange of products. This concept can be traced far back in Leviticus, in the writings of Confucius, and in the records of the Egyptians.

I therefore venture to submit to the members of this association the suggestion that true as may be the theory of evolution as it now stands, it is not yet complete. It will remain inadequate until some philosophic observer yet greater than Darwin traces and defines the evolution of the mental or metaphysical forces by which mankind will surely attain its full development and dominion. Until the modern development of science and invention of the nineteenth century had become a part of the common practice and common knowledge of the civilized races, only the prophet or seer could forecast the conditions of peace, order, and mutual service which we have as yet so partially attained. Have we not now a basis for an inductive social science in this development? May we not rest assured or continue our work with full assurance that the humane element in the Divinity which shapes our ends and the divine element in the humanity to which has been given dominion over the forces which make for welfare, will be so combined and harmonized that the time will surely come when all mankind shall be free of what has been rightly named the hell of war?

Conclusion.—The ultimate suppression of war by the evolution of the forces of commerce may be well assured. War, however necessary it may sometimes be, must always remain a survival of brute or unintelligent force. Commerce, however restricted by the lack of intelligence among legislators, is yet an evolution of mental force, by which it is directed and by which it will ultimately dominate brute

force. War is destructive: commerce is constructive. Every phase of war is of necessity conducted by methods which have no defense in morals. It requires the employment of spies, the use of falsehood, the ambuscade. Its greatest successes are achieved in getting the advantage of the enemy and striking him in the back. The art or invention of war consists in making each instrument of slaughter more and more effective, the advantage in the end falling to the gun of longest range, unless success is attained even under bad management by the yet greater incapacity of the enemy.

Commerce exists by the law of service. Its benefits are mutual. Its conduct demands probity and integrity. "The trust reposed in and deserved by the many creates the opportunity for the fraud of the few." War can only exist so long as the private soldiers are ignorant on the one side or the other. Had not the Confederate private soldiers in the civil war in this country been ignorant of the evil influence of slavery upon themselves they would not have fought in a war for the maintenance of slavery. If the conscript soldiers of Spain had not been kept in ignorance of the abuses of the rights of the Cubans by their own oppression at home, there would have been no cause for interference on the part of this country, and there could have been no war. When the men behind the guns in Germany become fully informed of their own rights, as they are rapidly becoming, they may cease to submit to the domination of the classes who carry the sword. The mediæval Junker who now assumes the powers of emperor will then become as helpless as his mediæval prototype, the knight in armor, became when gunpowder was invented. The brute rule of blood and iron will then give place to the intelligent rule of commerce and mutual service.

Taxes are collected at the barriers which part European nations from each other by duties on their respective imports to the amount of many hundred million dollars, and yet that revenue does not suffice to support the armies which except for those barriers to mutual service would not be required and could not be sustained.

As surely as the mental factor in production giving direction to the forces of Nature evolves increasing welfare, so surely will the brute force of war and the survival of the fighting instinct in man be suppressed by that spread of intelligence and common sense which is generated in the very conduct of commerce itself.

RECENT statistics show that since the end of 1869 the postal traffic in France has nearly tripled, the telegraphic network has increased about nine times, the tonnage of the railways and interior navigation has doubled, deposits in savings banks have risen from $150,000,000 to $800,000,000; and other items of economical prosperity have shown corresponding growth.

PLANT LIFE OF THE CANARY ISLANDS.

By ALICE CARTER COOK.

THE Canary Islands have appealed to the world under various aspects. The ancients idealized them, mediævals fought over them, and moderns are analyzing them. The fire-tried rocks, crevasselike gorges, and confused mountain masses make a fascinating field for geologists; curious Coleoptera attract the entomologists; hills, valleys, and shores abound in interesting plants; the climate and meteorological conditions have been the study of many doctors.

One's first view of Grand Canary is most disappointing. The "Fortunate Islands" of Lucian—abounding in luscious fruits, covered with luxuriant forests, where the sun always shines, and Nature, unaided, liberally supplies all needs—are a mental picture which is sadly shattered by the reality. The low coast is buried in shifting sand blown across from the African desert. Behind it are bleak hills colored a dreary gray by drought-loving euphorbias. We wonder where the materials for such glowing descriptions as Humboldt's, Leclerq's, Edwardes's, and Berthelot's are hidden.

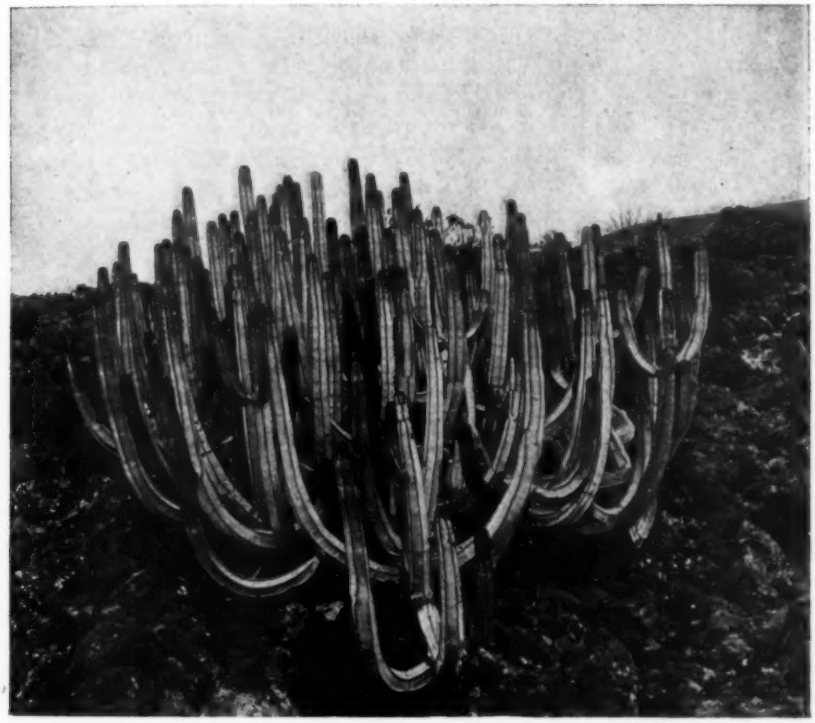
Closer acquaintance banishes our doubts, and we soon learn to love this land of crags, and find from hilltop, in valley, and on seashore views unsurpassed by the oft-sung beauties of Switzerland or Norway.

The flora of the islands was studied thoroughly sixty years ago by Webb and Berthelot, who with indefatigable zeal scoured peak and plain. But they were unable to visit personally two of the islands (Gomera and Hierro), and spent only a short time on Lanzarote and Fuerteventura. The results of their studies of the phanerogams were published in three large volumes with fine plates —now out of print and very difficult to obtain. Since that time various botanists have spent longer or (usually) shorter intervals on the islands, but no other extensive work has been undertaken, and doubtless many plants, either undiscovered by these pioneers or introduced since their time, or reported by them from only isolated localities, remain to be studied; and the scattered results of the different investigators should be incorporated into a complete botany of the archipelago.

The flora of the archipelago includes, according to a recent publication, twelve hundred and twenty-six species of vascular plants; four hundred and fourteen of these are found nowhere else in the world, or only in Madeira, the Azores, or the Cape Verd Islands. These three island groups together with the Canaries constitute the so-called "Atlantic Islands"; all are of volcanic origin and have many

features in common. They are, moreover, connected by a narrow submarine plateau which, perhaps, argues a former means of more intimate communication.

The general character of the Canary flora is that of the Mediterranean region. Some species show Indian or South African relationships; still fewer have American affinities. The Gulf Stream still brings drift, including seeds and the branches of trees, from the Bermudas by way of Madeira to our islands. Columbus, who made frequent visits to Gomera, found on its shores fragments of West Indian



EUPHORBIA CANARIENSIS, growing on bare volcanic rocks.

plants, and was thereby strengthened in his belief in a western continent. An occasional east wind—such as sometimes brings armies of grasshoppers—may carry seeds from the Sahara region. Indeed, the woolly seeds of *Gomphocarpus fruticosus* are said to have been brought on the spiny legs of the grasshoppers. But the prevalent winds and ocean currents of to-day form a barrier between the Canaries and the continent, and among the sixteen hundred and twenty-seven species enumerated from Morocco by Ball, only two hundred and sixteen are found on these islands. That the former more effective means of communication must have been of very

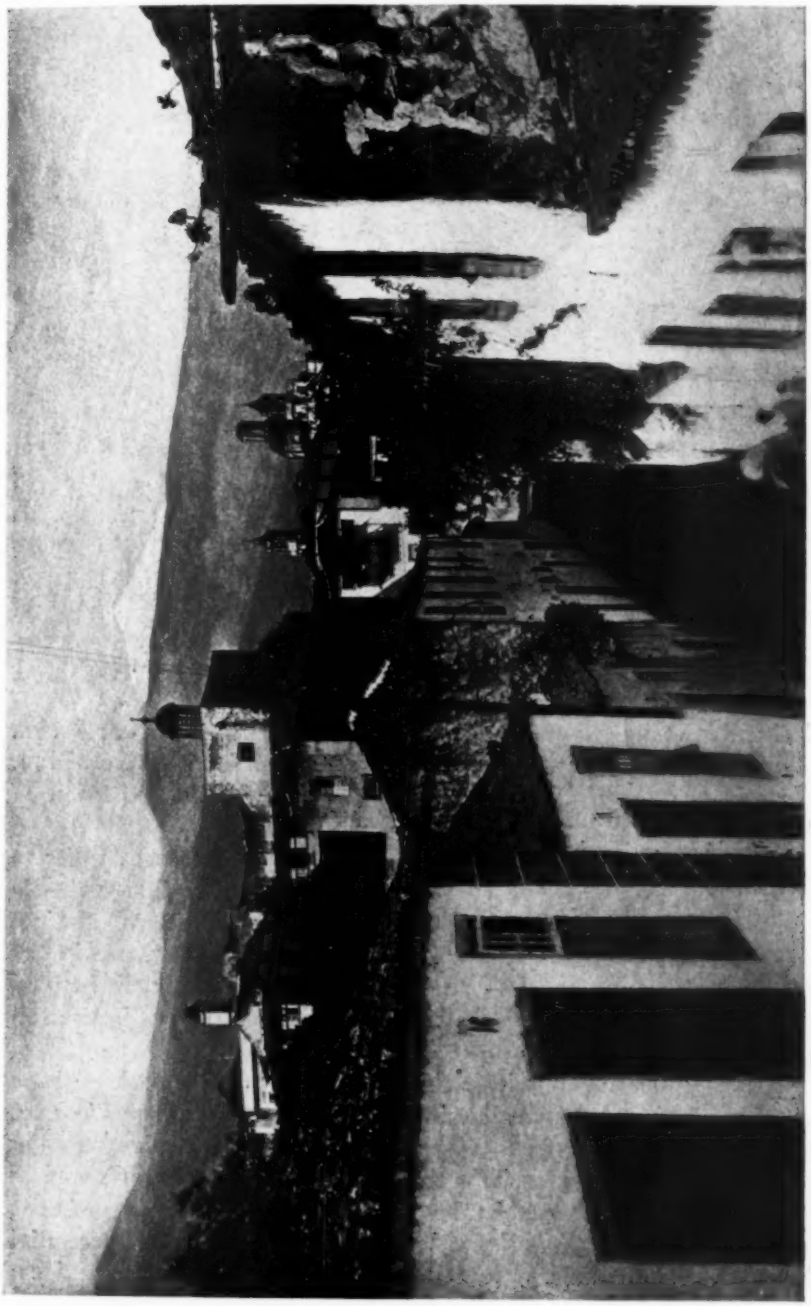
remote date is clearly evidenced by the great development of peculiar species of continental genera. Moreover, Saporta proves that types now found only in the Canaries (or perhaps also in Madeira, the Azores, or Cape Verds) existed in Europe in the Tertiary period. Such are the native laurel, viburnum, and pine. The persistence here of these ancient types speaks strongly for the constancy of the climate—to-day a strong attraction to invalids—for the average summer and winter temperature hardly differ ten degrees.

The great age of the archipelago is further indicated by the marked individuality of the flora of each island. The species have had time to develop in various directions under the influence of the different conditions to which they have been exposed, and the difficulty of obtaining foothold in the rocky, volcanic soil (pointed out by Christ) has doubtless often prevented the intermixture of the parent and derivative forms, so assisting in the formation of new species. For it must have been only rarely that the seeds or fruits brought from one island to another, or from the mainland, have found themselves in places favorable to development. So species-making has progressed, and as a consequence we find Teneriffe with twenty-seven species known from no other region, Grand Canary with seventeen, Palma with eleven, Gomera with ten, Hierro with three.* Fuerteventura and Lanzarote, on account of their greater proximity to the African coast, have a somewhat more continental aspect of vegetation than the more westerly members of the group. They have together thirty-two species which are either confined to them or found very seldom on any of the other islands. Other peculiar species are common to two or three islands only.

The soil is very rich. With irrigation three harvests a year are regularly gathered on Canary and Teneriffe. The water supply is largely kept up by the cloud belts, which even in the driest seasons form almost daily over the higher mountains, feeding the springs there which are the life of the land. But, as has already been said, the rocky, volcanic nature of the coast forbids the entrance of many plants, and this fact has had great influence on the character of the flora. The craggy hills and stony shores have a decidedly desert aspect, and adaptations to drought in the form of fleshy, hoary, and coriaceous leaves and stems abound. Euphorbias take the place and have the appearance of the cacti of American deserts. Fleshy *Crassulaceæ* of the *Sempervivum* group are more abundant here than in any other part of the world. There are twenty-two species of them which are found nowhere else. Such fleshy plants are not confined to the volcanic wastes and shores. They project from the

* The number of peculiar forms on these two very fertile islands will doubtless be increased when they are more thoroughly studied.

most precipitous and rocky sides of the gorges. The urban flora, which makes Laguna and other old towns so picturesque, and which Berthelot describes as largely a duplication of that of the ruins



VILLA ORATAVA AND THE PEAK OF TENERIFFE; also showing *Senecio* and *Sempervivum* growing on the tiled roofs.

of the Coliseum of Rome, consists conspicuously of fleshy-leaved *Sempervivums* and *Senecios*, whose roots penetrate the tiles of the houses and the stones of the streets. It is curious how many of these fleshy plants have their leaves growing in rosettes, producing a simi-

OPUNTIA TUNA, the wild prickly pear with bright scarlet fruits.

larity between the members of widely separated orders (e. g., *Euphorbia balsamifera*, *Sonchus Kleinia*, species of *Sempervivum*, *Senecio*, and *Statice*). Is this also a means for the reduction of transpiration?

The same question (this time as regards the flowers) applies to the species whose blossoms close soon after noon. The volcanic wastes, brilliant in the morning with the bright flowers of *Helianthemum*, *Fagonia*, *Calendula*, *Sonchus*, and *Anagallis*, are in the afternoon like a house where the lights are gone out, for all the blossoms have gone to sleep, and there is nothing in sight but brown soil and dull-green leaves.

The curious plants with twiglike leaves seem also to have been provided against too great loss by transpiration. Such are *Plocama*, a strange rubiaceous shrub which looks like a diminutive weeping willow; *Genista rhodorhizoides*, called by the insulars "retama," whose flowers appear even in the dry season, and, in the time of rain, whiten the hills; *Spartium junceum*, an even more perennial bloomer, with brilliant yellow blossoms brightening dusty waysides;

Sonchus spinosus, of the volcanic regions, generally afflicted by the dodder which bears its name; *Asparagus*, *Ephedra*, etc.

As one travels from the shore to the interior, the flora slowly changes as the temperature falls. In Teneriffe there is a gradual and complete transition from subtropical to purely arctic vegetation. Valleys, fields, hills, and gorges have their own characteristic plants.

The hillside flora is an interesting one. Often the whole lower part will be covered with an ugly growth of *Opuntia*, the prickly pear. There are two wild species, both very abundant and greatly esteemed for the sake of the pulpy fruit, which in the drier islands, where rain sometimes does not fall for several years, serves as a substitute for water. One was formerly extensively cultivated as the host-plant of the cochineal insect, but the discovery of aniline dyes has nearly ruined this industry. Still many fields exist, and the bare-footed women are yet to be seen passing between the spiny rows, putting the insects on each plant by hand. In the wet season, after being sown with the parasite in this way, the branches are tied up in

COCHINEAL CULTURE. The "newly planted" insects protected from rain by cloths.

white cloth to prevent the insects being washed off by rain, and a field so doctored is ridiculously suggestive of a regiment of bandaged feet.

These prickly things are disagreeable enough to the climber, but above them there is a most attractive region. *Asphodels* bloom in

prodigal luxuriance. *Gladioli* have a brief period of gaudy predominance. Fragrant white *Amaryllidaceæ* are there, and the dainty-flowered *Romulea*. Hidden among the rocks grows the little native Jack-in-the-pulpit. The common brake, *Polypodium*, and *Davallia*

COCHINEAL CULTURE. Old plants of *Opuntia ficus-indica* with the "ripe" insects surrounded by a white, cottony, protective excretion.

are here as everywhere among the rocks, and more rarely the sweet-scented fern and a species of *Notholæna* peep from the chinks of the crags. Gray clumps of the giant Canary *Euphorbia* rise sometimes to a height of twenty feet, and among the great columnar branches twine coils of spiny *Rubia*. There are several woody species of

dock often seen on the steeper hillsides, and occasionally a shrubby *Convolvulus*. The *Echiums* reach great development on the islands. There are several peculiar species. The immense spikes of white or blue flowers are a common and striking feature of the landscape. Shrubby *Hypericums* also abound, both on hillsides and in barrancos.

The so-called "barrancos" are a rich field for the collector. They are deep, narrow cracks between hills which have been sundered by volcanic disturbance. Erosion has had little or no part in their formation. Many of them are not watered at all, and if followed to their sources are found to end blindly among the hills. In some the winter rains collect and remain as stagnant pools or slow-flowing streams through a part or the whole of the year. Others are beds of perennial brooks fed by springs among the hills, and sometimes, in seasons of heavy rains, the waters rise above their narrow channels and rush in floods to the sea, causing great devastation among the fields and homes of the farmers. Teneriffe, Canary, Palma, and Gomera are supplied with such streams and springs. The whole island of Lanzarote has only two insignificant and inaccessible springs; Fuerteventura is slightly better off, while Hierro is entirely dependent upon rain water, which is carefully stored in cisterns.

Valleys, of which there are notable ones—such as that of Oratava, called by Humboldt the finest in the world—are distinguished from barrancos by greater breadth and less precipitous sides, and are not necessarily volcanic in their origin.

The exploration of a barranco is a fruitful occupation. Rare orchids and many ferns spring from between the damp rocks. A shrubby crucifer is occasionally seen on precipitous ledges, and more commonly an equally curious spiny and woolly-leaved composite. The blackberry, which is common in all sorts of localities, here takes on peculiar forms, and leafless suckers thirty feet long swing down the bare cliffs, seeking rooting place.

The bottoms of the watered barrancos and valleys are scenes of tropical luxuriance. The carpet of vivid grass is studded with loosestrife, oxalis, and clover. Wild forget-me-nots love the turf closest to the springs, and our garden nasturtium flings bright-flowered trailers profusely over the banks of the brooks. Maidenhair fronds grow in delicate beauty under the dripping ledges of the rocks. The tiny-flowered speedwell carpets retired nooks, and a species of *Lathyrus* with large, royal purple blossoms tangles itself around the canes. Here and there are clumps of palm and of native willow, rarely a specimen of the once common *Dracæna draco*, the famous dragon tree which yields the red gum once so esteemed as a dye and used by the aborigines in embalming their mummies. This tree is by some thought to symbolize the dragon which guarded the golden apples

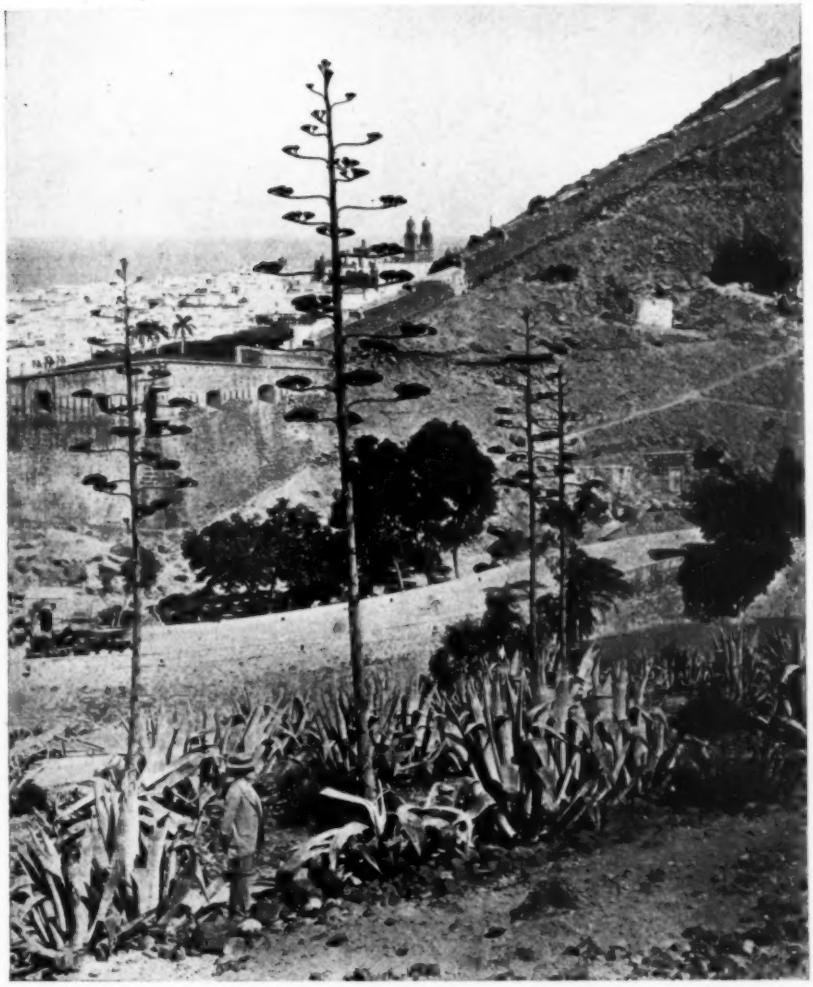
of the Hesperides; for the ancients tried to make old Atlas and his daughters inhabitants of our islands. To moderns this tree is chiefly remarkable on account of its exceedingly slow growth and the very great age which it attains. A specimen at Orotava was estimated by Humboldt and others to be from six thousand to ten thousand years old. This individual was hollow, and had been an object of veneration to the Guanchees since immemorial times; their Spanish conquerors turned it into a chapel. It was blown down in 1868, but

THE DRAGON TREE (*Dracæna draco*) AT LAGUNA, TENERIFFE.

numerous existing trees of much smaller size are still held to have an age of from two thousand to four thousand years.

There is an oak which seems to be thoroughly naturalized in a few places, and a silver-leaved poplar has monopolized whole valley sides. Near the aqueducts and brooks buttercups, vetches, flax, clover, catch-fly, sweet clover, sorrel, and plantago abound. In the drier barrancos grows an acacia with globular, orange-colored balls of sweet-scented flowers, also a native sage and the tamarisk tree, with an occasional sturdy castor-oil plant. Very rarely one is fortunate enough to meet with a specimen of a species of juniper formerly forming great woods, now almost extinct on the islands. The cultivated fields and the roadsides have a flora of their own. Among the beans planted as fodder, the white-flowered sweet pea grows luxuriantly, sweetening the air. Vetches, geraniums, morning-glories,

larkspur, poppies, and other highly colored flowers rush into bloom on the first approach of spring, making the fields look like veritable gardens of the gods. The roadsides and hills and neglected fields produce numerous gorgeously colored yellow, purple, and red



THE AGAVE IN BLOSSOM. A Spanish fort and the city of Las Palmas in the background.

thistles, of a great variety of genera, very beautiful to look at, when one has not been trying to pick them.

Some plants which have been introduced for cultivation have become partly or completely naturalized. The aloe, which we know as the "century plant," makes hedges along the pathways, and is planted up the mountain sides in rows. It is used as fodder for goats and as thatch for peasant houses, and from the fiber are

made baskets, mats, and fish cords. The flower stalks shoot up to a height of fifteen to twenty feet in an incredibly short time, and like mammoth candelabra, as they look, are a striking feature of the landscape. The graceful pepper tree, commonly planted along the highroads, seems to be wild in a few localities. Large groves of magnificent chestnut trees are found on Canary and Teneriffe. The fruit is gathered and sold in great quantities. The almond industry also flourishes in certain regions, and the beautiful trees cover the valleys of a most charming part of central Grand Canary. Fig trees were introduced by some of the earliest European adventurers, and have now become thoroughly established, their fruit being one of the staple foods of the islanders. Oranges and bananas, the chief exports of the country, only grow when planted. Tomatoes, the third great product, are occasionally wild.

But the collector's richest fields are the forests. It is impossible to picture to one's self the paradise these islands must have been before the conquering Spaniard wantonly destroyed so much of the woodland. Fuerteventura and Lanzarote are now entirely destitute of native trees, and with the trees went many precious springs, so that these two islands are now practically desert. The chaplains of Béthencourt, who were in Fuerteventura early in the fifteenth century (1402), describe it as "covered with rich vegetation; lentiscos, olives, date palms, tamarisks, and cardos (*Euphorbia canariensis*) made dense woods," and as having numerous brooks and abounding in herbs and plants and fragrant flowers, which gave to the island a charming and agreeable aspect. Pedro Gomez Escudero, writing of Canaria in the same century, says: "The whole island was a garden, all covered with palms; because from one place, which is called Tamarasaite, we took more than sixty thousand little palms, and from other parts an infinite number." And Dr. Chil says: "After the conquerors and their descendants had for more than three hundred years declared war to the death against the forests, yet at the beginning of this century many leagues were so covered with dense woods that, in going from Telde to San Lorenzo, one arrived in this latter village after a summer day's journey without having seen a ray of sunlight, having passed continually beneath a copious foliage where plants grew perennially fresh and luxuriant." These incontestable facts seem hardly credible, for one would need an abiding supply of scientific enthusiasm now to stay long enough among the scorched rocks of Fuerteventura to make the careful study of their life which is needed. Hierro and Palma are still well wooded, and the extensive forests and abundant water supply of Gomera make it, in Dr. Chil's estimation, the most beautiful member of the archipelago. Only scattered tracts of woodland remain in Canary and Teneriffe.

TAFIRA, GRAND CANARY. The hill in the background is of volcanic ashes and is covered with vineyards; on its left slope are a few specimens of *Pinus canariensis*.

The native pine is a stately tree with wide-spreading circular crown. Its nearest relatives are Mexican and East Indian species. It still covers large tracts of land, and one may ride for hours over the needle-covered ground where hardly any undergrowth breaks the pleasant monotony of the uniform, soft brown. The Canary tamarisk grows in clumps in the drier barrancos, and is also found in the groves of wild olives, *Lentiscus*, and *Bosea* which still exist as remnants of the woods which once covered the hills around Tafira. The wiry stems of a twining asclepiadaceous plant (*Periploca*) wind around these low trees, sometimes making impassable thickets. There are fine forests in Los Telos and near Firgas in Canary, and still more beautiful and much larger ones in the vicinity of Laguna, Teneriffe. Du Mont d'Urville says of one of these (*Agua Garcia*) that it recalls perfectly the forests of the isles of the Pacific Ocean and of New Guinea. One may ride all day through the half twilight of the dense woods. There are four native species of laurel, belonging to three genera, which here attain superb size; two species of tree heath, two of holly, a beautiful *Prunus*, and an arbutus tree whose bright orange fruits resemble miniature oranges. The forest flora has a dense undergrowth of native viburnum, shrubby species of the mint, and umbellifer families. There are brooks and beautiful waterfalls, and on the banks of these ferns grow to a height of from four to seven feet. Around the bushes and trees twine the European ivy, and the curious *Canarina*, a large-flowered member of the morning-glory family, and *Danaë*, a plant of the smilax tribe, whose flowers spring from the margins of broad-leaf-like stem expansions. One of the loveliest of the forest flowers is a large, pale-violet geranium with anemone-like leaves. But mere enumeration can give no idea of the beauties of these wonderful woodlands. Where there have been forest fires or clearings, a host of weeds spring up which, Berthelot says, gain predominance over one another in a certain definite succession, leading gradually to the reformation of forest.

Some of the most curious plants of the island flora have a limited distribution. The crater of Badhama in Canary has one or two species unknown elsewhere. Near the great rock of "Saucillo," a pillar of stone, near the center of the same island, one or two unique species have been found. The great crater of Palma, one of the largest and most perfect in the world, is the cradle and only home of others. Above all, the grand old "Peak" and its circle of surrounding mountains, the Cañadas, have proved most prolific in peculiar forms. More thorough exploration may perhaps extend some of these limited areas, but probably will not contradict the extreme isolation of many species. The careful study of the distribu-

THE CRATER OF BANDAMA, GRAND CANARY; 900–1,400 feet deep; the bottom is inhabited and cultivated.

tion and relationships of the flora of this ancient archipelago still has in store for him who can undertake it many most interesting and instructive discoveries. A complete knowledge of the present condition and past history of the plant life of one such small part of the world would be of infinite help to the comprehension of all larger regions.

THE PHILOSOPHY OF MANUAL TRAINING.

By C. HANFORD HENDERSON,
DIRECTOR OF THE HIGH-SCHOOL DEPARTMENT, PRATT INSTITUTE, BROOKLYN, N. Y.

V.—THE PLACE OF MANUAL TRAINING IN A RATIONAL EDUCATIONAL SYSTEM.

I HAVE tried to show in previous papers the grounds upon which manual training rests its educational claims, and to point out some of the results of this training. It remains for me to indicate the place which manual training ought to occupy in the whole scheme of culture. I shall not consider formal education *plus* manual training, but rather a system of education in which manual training forms an integral part. So considered, the question becomes a very comprehensive one, for it amounts to nothing less than an examination of our whole scheme of secondary education.

It has been insisted upon all along that education is a process, a tool, a means to an end, and not in any way an end in itself, not something fixed and sacred, but something quite fluid and alterable. And, further, it has been suggested that education is but another name for the process of evolution made conscious, and must consist in such control of the environment as will bring about the desired human reactions.

The problem before us is quite definite. Given babies of three and four years, what shall be done with them up to eighteen years, so that they shall evolve into desirable types of men and women? The present system, as you know, is somewhat elaborate. The kindergarten, elementary school, and high school cover just the ground we are considering. It is a continuous, well-co-ordinated process, and some of its results are quite beautiful. But I believe that it is not the best. The problem is to build up a system which shall be in accord with our accepted philosophy of life, and shall satisfy the ethical and social ideals of the heart. At three and four, what have we given? At eighteen, what do we want? The answer to these two questions is the educational data. How shall the material given grow into the material wanted? The answer to this question is the educational method. It is this latter answer that involves the application of manual training.

I shall not speculate very long upon the material of babyhood. Clever men and women are at work upon this problem, and they have already made preliminary reports of the highest interest and value. Now that mothers have been enlisted in the work and have been encouraged to record observations made in their own nurseries, the data will doubtless grow apace, and soon lead to wider knowledge. I recently spent a morning at Miss Aborn's model kindergarten in Boston. The children were from three and a half years up to six. The drama was full of action, full of life, full of suggestion. When twelve o'clock came, and the little people marched out of the room, I felt very much as you do when the green curtain goes down at the theater, and the play is at an end. Teddy and George and Hazel and the rest remained very real figures in my thought for many days. The impression made by such practical studies as these is a double one. Looking at the children alone, the one great fact that absolutely forces itself upon your attention is their intense individuality. Each little person is a bundle of possibilities, but each bundle is so different! You can imagine no one process able to deal successfully with all of them, or indeed with any considerable number of them. You are face to face with the great fact of heredity, which can not be ignored and must not be belittled. Fate, or destiny, or Karma, or predestination, or whatever you choose to call it, accomplished more than half her work when the child was so born, and can well afford to hand him over ironically to the schoolmaster. Looking too steadily at this great fact robs one of hope. So much has been done and settled once for all, quite placed beyond the chance of our control, that it seems hardly worth while to work and struggle over what is left. Yet fate is not altogether unkind. The very persistence that baffles us, gives a permanence to the type which in a longer view is touched with promise.

And then, there is the other impression. Looking at the teacher and remembering that it is the outer world that is to react upon these little organisms, and noticing how completely she may control this outer world, and how skillfully she may direct its reactions, one is struck anew with the tremendous forces in the hands of education. In the kindergarten much more than in the elementary schools one finds a flexibility in the educational process that is a promise of high efficiency, for it not only allows for the intense individuality of each little person, but builds upon it. The direction of this constructive process will depend upon what we want at eighteen years, and this question of what we want is always pertinent, for in such an elaborate process as modern secondary education there is a certain inertia, and it seems unavoidable that much should come to be done that has no direct bearing upon what we now want. Familiarity dulls our power

of observation, and we are apt to drift into a state of mind where, as Professor James would say, inconsistencies cease from troubling and logic is at rest. But even when we are aroused, we evoke a picture of our wants in which it is easy to mistake the values. My present purpose, however, is not to evaluate human qualities, but to seek out and emphasize those that are essential, separating them very rigidly from those that are secondary and unimportant. I restrict myself to the narrower task because from a monistic point of view these human qualities are so bound up with one another, are so thoroughly but different aspects of the same unit, that they can not be stated in squence. They do not follow one another. They coexist. It is a single panorama, human life, crowded with different elements, but making only one picture.

The advantage of thus defining what you want at eighteen is that no scheme of education will be tolerable which does not lead by direct and scientific methods to the desired results. It is possible, of course, to introduce various elements into the scheme of instruction, and allow the principle of natural selection to work, trusting that in the end there will be a survival of the fittest. But this is scarcely evolution made conscious. It is only consistent with an expediency system of morals, which makes life a daily, hourly experiment, and rests upon no underlying principles.

At eighteen, boys and girls stand on the verge of manhood and womanhood. Goethe says, "Be careful what you pray for in your youth lest you get too much of it in your old age." What these boys and girls pray for at eighteen is pretty well settled, and they will be pretty sure to get it. The best part of life is still ahead, but the tendencies are already there, and that is after all a large part of education. You have perhaps heard of the country girl who was asked what her brother was doing at the university. She replied naïvely that he was learning to be a student. He was a lucky fellow if his sister were right. I find life, myself, a tremendous experience, and very, very full of interests; but when I look at the natural history of these interests I can trace nearly all of them to some beginning, however faint, in the nebulous thought region of sixteen.

The ethical ideal that I have tried to place before you is that of a perfect human organism exercising its functions in the fullest possible measure. If I may use a biblical expression, it is the being perfect even as God is perfect. I believe, as I say, in this divine perfectness, not as a thing to be gained here and now, all at once, at an emotional revival meeting, but something to be grown toward and cherished as the ultimate ideal, something that is to come as the result of the operation of adequate causes. The special characteristic of this perfectness is its inwardness and its unconsciousness. As the flower

blossoms and the tree grows, as the earth moves and the star shines, all as the result of an inner quality, all in fulfilling the law of life, so the soul of man when it turns from the piety of the cloister to the piety of Nature is under the stress and strain of no moral conflict, but is at peace. Morality spans the difference between what is and what ought to be. When these coincide in the perfect life, morality has fulfilled its function and must cease to be. The gods are not moral. To attain the divine perfectness is to outgrow morality. These young people of eighteen, in whom we are interested if they are to come into the perfect life, must do so as the result of their own spontaneity, and as unconsciously as possible. The process of education which is to endow them with a perfect organism and plant in them the seeds of the complete life fails unless it leave them spontaneous and wholesomely unconscious of themselves. One of the most dangerous dangers of the schools, if I may so express it, is self-consciousness. It mars nearly all whom the schools touch, and makes unendurable the teacher of too long a term of service.

The term organism, once for all, stamps the man or woman, boy or girl, as a unit, and we may speak of the bodily, emotional, and intellectual functions of the organism without being misunderstood. We may conveniently enumerate under these three heads those essential human qualities which are of prime importance in the educational data. The bodily life includes birth, nutrition, growth, reproduction, death. We may limit nutrition, restrict growth, avoid reproduction, but we can not escape the first and last of these great functions, birth and death. Yet complete morality is only satisfied with the complete discharge of all these functions. The morality of birth lies with our ancestors. They owe it to us, as we owe it to our children, to give birth only to sound, true bodies. Yet a perfectly healthy man or woman is a rare sight. The morality of nutrition and growth is the morality of hygiene and health. It is satisfied only with strong, sound, beautiful bodies, beautiful not only to look upon, but beautiful in the perfection with which they operate, the sound digestion, strong pulse beat, free circulation, deep breath, keen hearing, sharp eyesight, delicate touch, discriminating taste, quick will, co-ordinated movement—a long list, truly, but not longer than the requirements of the perfect life.

The morality of parenthood is bound up so closely with the emotional life, and is most holy when most closely bound, that it seldom finds distinct utterance, and such utterance as we have is mostly false—on the one side, the celibacy of religious orders; on the other side, a reputed duty to the state or to the race. I find the sanction of marriage and parenthood to reside in the individual. Men and women are better into whose lives the mystery of birth has

come, better by reason of that tenderness which it calls forth, and better by reason of that irresistible appeal to love and sympathy which a child alone can make. A life into which this holy experience has never come is not complete, whatever may be its other compensations. And I should deplore the higher education for both men and women if it made them less ready to meet the experience of parenthood, deplore it, not from the point of view of society or the state, for with the continuance of the race I feel that we have consciously nothing to do, but deplore it for the loss that it meant in their own lives.

The life of the organism begins in mystery, in birth. It ends in mystery, in death. But death may be terrible, or it may be beneficent. It is terrible when it comes as an interrupter to the full activities of life, and more terrible when it comes through slow, wasting disease and decay. But death is beneficent when it comes at the close of a complete, well-rounded life, comes as a savior from the infirmities of too great age. What is so universal must be good.

A scheme of education which neglects any of these functions of the complete bodily life, or fails to inculcate sound ideas regarding them, is sadly deficient, and can not be called rational. It would be a denial of the very philosophy upon which the new education rests.

The demands of the emotional life are no less exigent. Every human action has back of it a feeling, a desire. Where these desires are sluggish or wanting, the action is corresponding. We must never forget that we can only do what we want to do. It may seem a trivial statement upon which to base so much, but it is practically at the basis of all of psychology. However perfect the organism, the complete life is impossible unless back of the organism is the enginery of keen appetite and manifold desire. The whole human drama depends upon just this, upon mere sentiment, if you choose. This emotional life upon which so much depends, upon which everything depends, is wrapped up in the organism itself, is a part of the very flesh and blood, and can not be separated from it. It is only convenient to name it aside from the more obvious bodily functions. The same is true of the intellectual functions. I am naming them last not because they are least, but because they are greatest, and in the sequence of life they are the fruits of the others. The school works for those as the gardener works for his most perfect fruit. But if it work rationally, it must work, not from the empyrean downward, but from the earth upward, through sturdy limb, and branch, and leaf, and blossom.

The educational process itself is only highly evolved when it too recognizes in the most practical way the idea of causation, and adjusts its acts to ends. I often think that the friends of goodness miss

the realization of their aims by looking too steadily at the dazzling ideals by which they are led, and not steadily enough at those humble means which, in the unalterable sequence of cause and effect, must first be realized. The process by which thought is excited in the brain is quite as definite as the process by which an electro-magnet is energized. You must have the magnet and you must have the exciting cause. You must have the brain and you must have the stimulus, an inner something induced by an outer something.

But about the data of education we are pretty much agreed. Out of the material of babyhood, half plastic, half stubborn, we are by our scheme of education to evolve the potential men and women who knock at the doors of our colleges. Looking at manual training as a method, and comparing the material given with the material wanted, it is very clear that manual training can only form a part of the complete method. To span the gap entirely, and cover the fourteen years between babyhood and college, manual training will have to be incorporated into a scheme of education more thoroughgoing and more psychological than any that has yet been proposed. If genius be the seeing eye, the feeling touch, the hearing ear, the efficient brain; and if the highest and most complete manifestation of our human nature depend, as we believe that it does depend, upon the sensitiveness and soundness of the organism, the educational process which is thus to unfold and perfect the human spirit must include the cultivation and development of all the faculties—touch, taste, smell, hearing, sight, movement—that they may comprehensively and accurately report the outer world; must include the cultivation and development of the emotional life, that it may stimulate the senses to the full exercise of their powers, and, finally, must include the cultivation and development of those intellectual faculties which convert this rich phenomenal material into an evolved humanity. I can not in passing forbear the criticism that our current schemes of education, however lofty their ideals, devote themselves too exclusively to the intellectual life, and do not sufficiently concern themselves with the materials out of which that life is built, the sense impressions of the outer world, or with the tool that builds it, the human organism with all its emotional and artistic possibilities. Nor can I, in declaring manual training to be inadequate to the full demands of a rational education, omit to emphasize that it is the only scheme, including sloyd and the kindergarten, that has attempted to build up the educational process on organic grounds, and that it is inadequate, not because of any fundamental mistake in its philosophy, or inaccuracy in its methods, but simply because these methods do not yet go far enough. You know, perhaps, the rallying cry of manual training—put the whole

boy to school—but in reality it does not yet do this. It puts his hands and by necessity his eyes to school, and I shall always feel, no matter what the future of manual training may be, that it has done yeoman service in breaking ground along rational, causational lines, and in inviting our attention to the immense possibilities of a culture that is organic.

The rational scheme of education to which such an examination as we have just been making would unavoidably lead us, must include manual training as an integral element. If we substitute for manual training some more general and comprehensive term, such as faculty training, organic training, or, better still, if we dismiss all special terms of any kind whatever, and use education to mean the conscious process of human evolution, we shall have reached the rational scheme of education itself, and may feel that our search is ended. In such a scheme, manual training must occupy a most prominent place, for it has to do with the most obvious forms of touch. I wonder if you ever reflected that our entire contact with the outer world, our entire knowledge of it, is in the last analysis dependent upon but one sense, the sense of touch, and that the sensory nerves, those telegraphic lines between our consciousness and the outer world, respond to but one operator, direct contact? Yet this is strictly so. We see, because waves of light break upon the shores of vision; we hear, because waves of sound strike against the ear drum; we smell, because minute particles of the odoriferous substance, or perhaps because peculiar and as yet unnamed waves induced by such a substance, impinge against our noses; we taste, because of the direct impact of food and drink against the sensitive nerve ends of the tongue. We have but one sense, a tactile sense, and if instead of manual training we should say tactile training, we should pretty nearly hit the mark.

The full organic results which this rational scheme contemplates can never be reached, I am afraid, through the current curriculum, or through anything likely to grow out of it. The whole idea is too radically different. The present curriculum makes a brave assault upon the intellectual life along a road cut straight through the empyrean. The new education is after a still more complete intellectuality—and we are apt to forget this when the industrial view presses—but it proceeds along the road of the organism. It is not, then, simply choice that would lead us to part company with the old curriculum. It is something more imperative. It is bare necessity. And the radical scheme which I am about to propose must be accepted in some such spirit, not as indicating an idle love for things that are new, but because the things that are old will no longer serve.

In the kindergarten it is self-directed play and work; in sloyd, self-directed hand work; in manual training, technical hand and tool work that form the nucleus of method. In a rational education such as I have tried to suggest, it must be self-directed work so arranged as to develop the whole organism, and bring out the moral and æsthetic and emotional and bodily sides of life quite as thoroughly as the intellectual.

To carry this scheme into effect will require a very radical disposition of the school days. If we assume that the college has been rationalized, and I believe that to be the case at Harvard, and at other places where an elective course of study allows the freedom of the unfolding spirit, then I should put it as one of the first requisites of a sound system of secondary education that it should be broadly and thoroughly preparatory to the college. All the children will not go to college, but as we cherish the ideal of a liberalized and cultured America, we want an increasing number of them to go, and in any case we want the very best education possible for both classes of children—for those who go to college and for those who do not. And I should hold that either the colleges were gravely at fault, or our ideals of middle-class life were gravely at fault, if one educational path led to the one and another educational path led to the other. I can not, therefore, sympathize with that present tendency in public education which is attenuating the culture side of our high schools, in order that they may serve more immediate technical and commercial ends. I can not feel that it is in the province of the public high schools, or of the State that stands back of them, to turn out shopkeepers, clerks, bookkeepers, or artisans. The community life is impoverished by such partial products, when it ought to be enriched by the full measure of a human life. That education will be the best, will be the most truly educational, which leads to the college, even though it find the doors closed.

I have expressed the hope that a deeper realization of the dignity of human life will make the ripe culture of the college more increasingly imperative for every child, and I believe that this result will come about with the growth of the social conscience, and with the increase of that spirit of brotherhood which is even now appearing as a bit of leaven in our midst. I came up from the subway the other day with that exultation in my heart which I think the modern man feels as well as the Greek when he emerges from the nether world into the open sunshine. At the mouth of the pit a little figure was sharply outlined against the sky. It was the figure of a mere child, a little boy. His face was pale and worn. He was standing there drinking in the chill of the pit, attracted by the hope of selling his papers. I could not help saying to myself:

"Heaven help us all, this good city of Boston, this rich Commonwealth of Massachusetts, this boundless wealth of America, that we should so starve our children, these children of the State, starve them both in body and in soul!" Their only crime, poor little ones, is that their fathers are idle, or ill, or dead. Did you know that savage tribes are less unkind? I met an old woman on the street. She had an honest, patient face, and sad, appealing eyes. She was very frail. Her dress was much too thin for the bitter east wind that was then blowing. She carried a very heavy bundle, and was fairly staggering under its weight. She was suffering visibly. On the other side of the curbstone another woman of the same age was driving past. She was quite alone, save for the coachman, and had ample room. She did not stop. She passed quickly. No one was surprised. No one noticed it. Yet both were women. Both had been the possible mother of our Lord.

But these are gentle sights. You may see them for yourselves any day on the best of our many highways. If it were right to occupy your time and so play upon your feelings, I could take you to highways less esteemed, and show you sights less gentle. But perhaps this is enough. The point I want to make is this: that the rational scheme of education that we are seeking will include the cultivation of a social conscience which will make sights such as this impossible. We want a scheme that will concern itself with the helplessness of childhood and old age quite as devotedly as with the buoyant self-sufficiency of youth.

I take it, then, that this scheme of education is to prepare all boys and girls to enter college, and to open the door to an increasing number of them, and that it is to include with just as loving care the children of the poor as those of the more fortunately placed. And I take it that the fourteen years which it contemplates—from four to eighteen—are to be just as jealously guarded as a miser does his gold. For these years are of all the most valuable. The growing organism is more plastic than at any other time. The very motion of growth makes those molecular rearrangements possible, upon which skill and knowledge and character depend. You know that a piece of iron may remain idle in a warehouse for years and suffer no change of internal structure, but when this same piece of iron is put into a bridge, and subject to the incessant vibration of wind and traffic, it rapidly becomes crystallized, and must be replaced from time to time by more fibrous metal. The moving particles are more responsive to the crystallizing force. This is not an analogy, but a strict parallelism. The movements of growth make possible the physical changes in the organism. The priceless years are those under twenty. It must not be thought for a moment that I conceive educa-

tion to stop at eighteen or even at twenty. There are mental functions the most important and valuable of all that do not come to anything like full fruition for a score or more of years. A modern man living the most evolved life is now said to be in his prime at sixty-five. But I do mean that this subsequent life of fulfilled promise is largely, almost entirely, dependent upon the early life. The impressions were recorded then, the senses were cultivated then, the motor nerves were habituated then; in a word, the organism was prepared for the intellectual life, and the intellectual equipment pretty well determined once for all. To the after years remains the utilization of this equipment, a utilization whose quality and whose extent will depend upon the stimulus and circumstance of later life. It is well recognized among musicians that to play the violin successfully one must begin early in the teens. And it is so with many other arts. The highest performance will result when with the other organic equipment is wrapped up a potential stimulus, fundamental and deep enough to operate in after life, even against unfavorable circumstances, against grief and loneliness and disappointment, and still come out the victor.

Literary critics wisely discriminate between books which possess or do not possess that subtle something which we call the literary quality. The books which have this quality have been well described as the literature of power, for, however unliterary the reader may himself be, they take hold of him and influence him in a very real way. The books that are only tolerable because they record certain facts of value, the material out of which books might be made, rather than books themselves, have been described once for all as the literature of information. To serve the ends of the complete life we want in our schools the literature of power, and in quite as imperative a way we want the curriculum of power, as opposed to the curriculum of information. I have told you earlier how little value I place upon the informational results of the elementary schools, and how profoundly I mistrust them in failing to awaken a more insatiable intellectual curiosity. It has been my good fortune to have traveled quite extensively in this country, literally from Maine to California and from Georgia to Vancouver, for I have wanted to know what we meant when we said *America*. And as a result of this experience I have to report a very low standard of intellectual life among the youth of America, a very tepid curiosity regarding the things of the spirit. We are prone at Cambridge and at other centers of culture to take too favorable a view of this matter. I think that Cambridge is not typical of the culture of America any more than Oxford is typical of the culture of England. At both places we are studying high tide.

It is easier in the face of such failure, it is a much smaller pang to one's conservatism, to strike out from the current curriculum many of the old informational studies, and to substitute for them a training which is largely bodily and emotional and artistic. Reality and sincerity are the two things that we most want in life. The current objections to ideal schemes of organic education are that, with the rapidly turning wheel of fortune in this country, a course of instruction covering fourteen years—that is, from four to eighteen years of age—can not be taken by any large proportion of the children, and even for those who do start out with a reasonable expectation of completing such a course, interruptions are very likely to occur. And the question is pertinently put, What is to become of these children if they are suddenly thrown out upon the world before your carefully co-ordinated scheme of education has done its perfect work, and they have had little or no informational studies? I want to anticipate this objection, and to do it very thoroughly and very clearly. The answer is twofold.

In the first place, with the growth of educational and social ideals, the State will not leave the education of its children to such precarious circumstances. We are already wealthy enough to have all our children withheld from industrial occupations until they are twenty; and when the social conscience becomes sufficiently sensitive to do this we shall be still more wealthy, for we shall have more efficient and intelligent workers. It is a rough guess, but I should say that at the present time half of our workers are busy, not in supplying absolute human wants or even capricious wants, but are kept busy simply because the work of last year was so poorly done. The work of plowing, harrowing, rolling, planting, and harvesting a crop of wheat is practically the same whether you get sixteen or thirty-two bushels to the acre. In the case of material upon which human labor is afterward spent the case is even more striking. Good cloth, for example, will easily wear twice as long as poor cloth. For a given amount of wear poor clothing must be looked upon as a luxury. In addition to the extra work at the mill in producing two yards of poor cloth in place of one yard of good, there is precisely twice the amount of work in the tailoring shop in making up the two suits. There are, of course, clever politicians who would argue that such an abundance of work for the masses is a national blessing. But I do not belong to their company. I do not believe in outwardly directed, compelling, industrial work any more than I believe in suffering and disease. I believe in self-activity, in inwardly directed work that means the expression of ourselves in action, and I believe in the leisure to grow wise.

Thoreau found that by working six weeks he could maintain

himself a year. This meant six-fifty-seconds of his time. He was satisfied with very little—with less, perhaps, than was quite wise. If we more than double his figures, and remember that co-operative labor is far more productive than Thoreau's solitary hoeing, we may agree that one quarter of the waking life must go for bread. But we have still a large margin. If we allow the full measure of life, say fourscore years, one quarter of it would be just twenty years. A man working full time from his twentieth to his fortieth year ought still to preserve both his youth and old age from industrialism. Or working industrially for half the day, which would perhaps be wiser, his term of industrial service would stretch from twenty to sixty years of age, and would still leave the extremes of life free for preparation and reflection. I believe this to be a complete answer to the objection, and I have an unquestioning faith that society will some time, when its conscience is aroused, limit its industrialism to the years of maturity and of strength, and will not bind its burdens upon tender childhood and infirm old age.

But the answer, I said, is twofold. You may not share the social optimism that I have been setting forth. The second answer is quite as complete as the first, and is applicable to society as it is, or even to a society still more selfish and unchristian. The second answer is that, no matter when interrupted, a rational scheme of organic education is still the best that could have been given up to that time, and for its justification does not need academic completeness. I may say, in passing, that this is not true of the present curriculum. While the schools under the present lowly evolved social conditions must teach in a measure as if each utterance were to be their last, much of the work must, nevertheless, depend for its value upon a reasonable degree of completeness. This is particularly true of classical lines of study. Even in Germany, where the classics have a hold far ahead of anything they have here, educational philosophers are urging with increasing insistence that the main value of classical study lies in the content and only incidentally in the discipline. And you may know that in obedience to this thought the study of Greek is being urged more than that of Latin because the Greek ideals of literature and art and morals and life are so immensely superior to the Roman.

This thought, carried to its extreme, will of course land us in the position of the scientific humanists—if I may so name my own party—who bring to the study of classical writers an almost passionate devotion, but who study them solely for their content, and therefore in translation, in their own modern mother tongue, be it English or German or French.

A child can not enter into Greek as literature with less than from four to six years' study. If this be interrupted, the discipline of course

remains, but the main value has not been appropriated. This is also true of modern languages where they go along side by side in too attenuated courses. It is wise, I think, in our present social state, and perhaps it would be wise anyway, to make each day rich in its own rewards, each hour, each lesson, to teach, though without any loss of serenity or faith, as if each occasion were the last, and must contribute such content as it has.

If we worked in the spirit that I have tried to make clear to you, the early years of childhood would be given to manual training enlarged into faculty training—would be given, that is, to organic education, and to the cultivation of the sentiments, and not to the pursuit of knowledge as such. Knowledge may be better than riches, but children are little qualified to use either, if the knowledge is at second hand. It is quite surprising how happy a child can be and how wisely occupied without knowing whether the moon be made of green cheese or not; and for my own part I do not think that it much matters whether he ever knows, unless he be prompted by an inner curiosity to inquire. Children are organically impressionable and alert, and they have a fountain of feeling that may be so nourished that it will keep fresh and green the years of later life. They have, too, an immense appetite for the concrete world, but they are satisfied with a very small seasoning of the abstract. They are not logical, and I think the attempt to make them so, on such a slender experience of life, is not only time-consuming, but absolutely disastrous to the best results in later years. The hope and promise of the future lie in keeping children children, and boys boys, and girls girls. It is quite fatal to have men and women prematurely born.

The enrichment of the curriculum along organic lines can only be carried out at an expense of time, but just so soon as we are persuaded that this is what we want the time can readily be found. The old curriculum must be heavily pruned in any case, and this will make room for better things. We shall want to omit two classes of studies altogether: first, those that are abstract; and, secondly, those that are involved in other studies, or in a general experience of life, and would be learned by the children themselves a year or so later. To sweep away these two classes of study from the elementary school —happily, they have never been given place in the kindergarten— would leave a large gap, and would make us very rich in the opportunity for more profitable organic work. Here is the list of elementary studies: reading, spelling, English, modern foreign languages, Greek, Latin, writing, arithmetic, geography, United States history, civil government, drawing and science lessons (usually physiology, with special reference to the shocking effects of alcohol and tobacco).

This certainly invites a willing use of the editorial blue pencil. What shall we cut out under the first head, as being too abstract? I should say all mathematics, all systematic history and civil government, all grammar (this would exclude the classics), and all mechanical drawing. Under the second class, studies involved elsewhere or better learned by implication, I would cut out formal spelling, formal writing, and formal political geography. I seriously propose, then, and I ask your very serious consideration of the proposition, to cut out mathematics, history, civil government, grammar, classics, mechanical drawing, spelling, writing, and political geography—almost the whole equipment of an elementary school. We have left of the old curriculum only the speaking, reading, and writing of English, and of French or German; the study of science (preferably *not* physiology), and free-hand drawing. This fragment, poor as it may seem to you at first, could yet be made the material of a rich culture. When you add to this the cultivation of the body, and the faculties of touch, sight, hearing, smell, taste, speech and movement, and the acquisition of those accomplishments which from their organic nature must be learned, if at all, in childhood, such as instrumental music and singing, you will find that the days will be more than full—full not of weariness, but of delight. The studies which I have so mercilessly cut out from the curriculum may safely be left to the high school, and some of them left out altogether. Should Jack or Margaret fail to reach the high school, I am still very strongly of the opinion that the acquisition of those accomplishments and powers that I have here suggested would enrich their lives with a graciousness and success that could never have been extracted from the old studies.

Let us look at this new curriculum. To speak English correctly in a clear, pleasant voice, to read it intelligently and agreeably, to write it plainly and without ambiguity—this in itself would be a liberal culture, which few of us attain to. But the end is not yet. Think of what is involved in our reading. We can read stories of our country, of the men and women who have made it great; we can read descriptions of colonies and explorations, and later states, we can read its best and most stirring literature; and we can do all this in the presence of pictures of the men and women and places, and of maps of the lands, and can get a deeper and more human knowledge of America than could be gained by any amount of unemotional history and civil government and geography. In the same vivid way we can study the history, geography, and civilization of other times and places, not as something to be mechanically learned, but as something to be experienced, something to lay hold upon our sentiment and affect our life.

I believe that this sentiment study of the English language should be the foundation stone of modern education. In a smaller measure, but in the same spirit, a modern foreign language may be taken up and entered into and possessed, and especially if but one be taken up at a time. I have omitted spelling, writing, and geography from this new curriculum, because they are better taught as involved in the other work. Spelling at best is a mechanical virtue. I happen myself to be a good speller, but the hours I spent with the spelling-book were numbered. I have learned to spell because much reading has familiarized me with the appearance of words, and I happen to have a visual type of memory. I recognize words now much as I do maple or oak leaves, and with as little difficulty. I am disposed to think that the testimony of others would be similar to mine. In the same way it is hardly worth while to have a separate copy book when all the written language work should be an exercise in writing, or a separate atlas when all reading involving places is done in the presence of a large map. This is what I mean by cutting out studies that are better taught by implication. And in defense of this suggestion, I would call your attention to the fact that the best things of life—courtesy and morality and taste and religion—are not formalized. They are taught by implication and by example.

The science work offers another fine chance for correlation. It should be thoroughly of the surface, and should have to do with the tangible things that interest children, plants and animals and stones, as they touch human life. No skeletons, no systems, no schemes of classification, but flesh and blood and realities all the time. The fatal blight on nearly all elementary pedagogical work is our passion for systematizing, a passion doomed to disappointment, and the forerunner of many dreary failures. One can only classify when one has a lot of material. The children haven't this. They must first get it. The quest will occupy them at least up to the high school. The science work had much better begin with some observational and in a large way experimental branch, such as physiography. Physiology is not superficial enough, and can not be well taught in the absence of an elementary knowledge of physics and chemistry.

The drawing, which I would have entirely free hand, is most valuable when used as a means for the expression of the child's own ideas. Let him draw what he likes, and let the teacher help merely in the method of representation, and then chiefly by suggestion. But these ideas, I am glad to say, are already being worked out in some of our schools. You may have seen the curious pictures that children make of soldiers marching, or of a ball game, or you may have been amazed at their original conceptions of animals and In-

dians and other creatures dear to a child's fancy. The results are undoubtedly wild, but they are full of promise.

The main point in these suggestions is that the language and science and drawing, thus cut down to the possible and essential, shall be as sincere and as real as the best insight of the teacher can make them. We can do all this and have plenty of time left for the cultivation of the body and the senses.

And we must begin this bodily culture by getting on good terms with our body, by admitting it to honorable fellowship with the mind. We must not be ashamed of our brother, the body. We must want it to be as subtile and pure and strong and beautiful and unashamed as is our spirit. It is a poor education which does not teach boys and girls to walk and run, skate and swim, ride and row, throw and jump, for upon these physical powers joy and health and life, the full and complete life, depend much more than they do upon such formal studies as arithmetic, for example. This bodily culture has an assured place in the rational curriculum, a scheme which fails signally if it does not produce vigorous bodies and warm hearts quite as surely as informed minds. Our motto is the one that you may read at Herder's grave in the quaint old Stadt-Kirche at Weimar: "*Licht, Liebe, Leben.*"

This increased time also makes possible the enlarged faculty training which a rational scheme demands. The present manual-training work has only to be enlarged so as to include all the faculties, speech and hearing, taste and smell, as well as touch and sight, and to do it not as so many drill exercises, but along the line of human interest and motive. It may seem to you a little fanciful that I include the sense of smell as a serious object of culture. But experiment shows that much of the gratification we get from food is wrapped up in the odor, and our life depends upon our food. Further, odors are the carriers of many helpful and delightful memories. A keen sense of smell means enlarged life, besides being a source of direct pleasure, and a safeguard against noxious influences.

All the senses are to be brought to a high state of perfection, so that they may comprehensively and accurately report the outer world, and by their mental reactions may build up a nerve tissue in the brain of high sensitiveness and power. The possible exercises along these lines are simply unending, and the more intimately they are prompted by the artistic conception of life, the more wonder-working will they be. From this point of view singing is quite as integral a part of voice culture as speaking, while instrumental music not only offers an opportunity for valuable æsthetic culture, but as well a physical co-ordination of sight, hearing, and touch that we simply

can not afford to neglect. And all this work, if it is to lead to the highest results, if it is to give us complete men and complete women, must be constantly touched with emotion, with the sentiment of kindness and love and unselfishness and justice and reverence. As I conceive our human needs and human possibilities, the very place where manual training, or rather a thoroughgoing organic training, would be of the utmost use, is the very place where in our whole scheme of secondary education it is found in the least measure—that is, in our elementary schools. When the high school is reached, there ought to be no change in the organic character of the work, but it will be safe to introduce a limited amount of formal and abstract study—geometry, algebra, arithmetic, grammar, history, civics—and to make the science work somewhat more analytic and searching. I must believe, both as a result of my experience with such measure of organic education as our present manual training, in tool work, music, and art represents, and as a result of my firm faith in the continuous and unalterable operation of cause and effect—I must believe, I say, that boys and girls under some such rational scheme of organic education as I have outlined would come to the college at eighteen, sound, vigorous, sensitive, well-equipped, magnificent material out of which to frame magnificent men and magnificent women.

My own conception of life is avowedly that of an artistic and moral possibility, and not at all as a commercial venture. I have come to believe that the wealth of the world is human; that the estimable things of life are personalities, are beautiful men and beautiful women and beautiful children, and I am quite willing that the scheme of organic culture which I am here advocating should stand or fall with this artistic and moral conception of life.

I believe most profoundly that the education which is to regenerate and redeem will be brought about by the setting up of permanent changes in the organism itself, changes brought about by the motive power of the affections, and through the cultivation of the senses, and having for their end and purpose the realization of a high social and moral and artistic ideal. And I believe, further, that in manual training we have the open door to a more rational and thoroughgoing education, and that we have only to enlarge manual training into a more complete organic training to make it satisfy the educational needs of the human spirit.

A RING or circle of raised earth at Todmorten, Yorkshire, England, which has been popularly regarded as a Roman camp, has, upon excavation, been found to be a prehistoric burial place of the bronze age, and to have contained at least six urns, with other relics.

WEATHER FREAKS OF THE WEST INDIES.

By F. L. OSWALD.

A UNITED STATES army officer, who describes the trials of garrison life in the far Southwest, remarks that the valley of the Rio Gila, though an inferno of dyspeptics, would be a paradise of weather observers, as they could stereotype their reports for a year in advance, and then go to sleep, merely leaving instructions to be waked at the approach of the one annual rain shower.

With a similar precaution for a possible lucid interval of showers, certain districts of western Oregon might enable an employee of the Signal Bureau to indulge at least the luxury of hibernation; but with every mile farther east the use of stereotypes would become more precarious, and the busiest American colleague of those Pacific sinecurists would probably be a "forecast manager," stationed on the southeast coast of Cuba.

Weather changes depend upon a variety of local conditions, modified by external influences, and on the two main islands of the West Indies the aggregate of those factors is complex indeed. A number of densely wooded mountain ranges, varying from low hill chains to Alplike sierras, alternate with arid plains and reeking jungles, and air currents from the eight principal points of the compass are apt to cause as many different modifications of humidity and temperature.

These imported meteorological tendencies have often to be taken into account to explain the curious weather freaks of special districts. The almost infallible visitations of cold waves that interrupt the summer heat of our Atlantic coast States about the beginning of July have been ascribed to the transit of iceberg chains drifting southward after the melting of their arctic moorings; but in the province of Santiago de Cuba these cooling and even chilling breezes come from the southwest, and have been traced to a reduction of temperature caused by the tremendous rainfalls in the coast forests of Honduras and Yucatan.

Straight west winds, on the other hand, often raise the mercury thirty degrees above the average of the summer season. The Gulf of Mexico has failed to neutralize the sirocco breath of the burning sand wastes flanking the valley of the Rio Grande. In the coast towns of Puerto Principe southern breezes may cool a midsummer night sufficiently to drive the natives from their house-top dormitories, and make foreigners supplement the scant bed cover of their *posada* with the contents of the dry-goods trunk; but the next night the northward shifting of the sea wind will illustrate the wisdom of the architect who has crowned the conveniences of the dwelling house

with a domestic summer resort. The interior of the building becomes absolutely untenable, the prejudices of the night-air-dread yield to the instinct of self-preservation, and before the noon of the next day the sweltering tenants begin to suspect the influence of a volcanic catastrophe or the possible correctness of Professor Falb's hypothesis of calorific meteor clouds.

But solar agencies are, after all, sufficient to account for the grievances of the atmospheric conditions. A brisk east wind will carry samples of African summer climate, sand haze and all, two thousand miles to seaward, and it might be questioned if the gehenna of the Great Desert could have aggravated the horrors of that afternoon of June 17, 1859, when the air waves from the Mexican alkali plains roasted the pears in the orchards of Santa Barbara, California, and blistered the arms of fishermen in San Pedro Bay.

The increasing frequency of droughts in the northwest provinces seems, however, to be mainly due to local causes. In the course of the last two hundred years the sugar and tobacco planters of western Cuba have cleared some five thousand square miles of once densely wooded coast plains, and a considerable portion of that area has shared the fate of the neglected grain fields on the east shores of the Mediterranean; uniform crops have at last exhausted the fertility of the soil, and winter rains have seamed the hill slopes with arid gullies. But in summer the moisture-freighted sea winds approach the thirsty coast lands in vain. Ascending air currents, caused by the refraction of sun rays from the treeless plain, sublimate the humidity of the atmosphere into a transparent haze, or waft the clouds across the low mountain ranges and the farther foothills of the island, which here measures hardly fifty miles from shore to shore.

From the terrace lands of San Cristobal (eighty miles southwest of Havana) heavy banks of clouds may often be seen rolling up from the Caribbean Sea, and twinkle with flashes of electric fire as they approach the chain of low islands which in a former geological period seems to have bridged the strait of Los Pinos. The afternoon heat increases with every minute, and all atmospheric auspices appear to herald a thunderstorm. Far in the south the horizon is streaked with evidences of a heavy shower, and thunder peals echo along the coast cliffs; but the sky overhead is still clear, and as the clouds approach the treeless *vega* their shadows pale, their masses dissolve and pass the island in the form of feathery cloudlets, high sailing and wholly revoking the promise of rain.

From the summits of the central sierra those same clouds may, perhaps, be seen lowering as they continue their northward course, and lavish torrents of rain on a reef of unappreciative rocks in the Strait of Florida. Billions of gallons for the felucca skippers who

fill their water barrels by means of rain sails, but not one drop for the parched plantations of the tree-destroyer.

Less easy to explain is the mania for cloud bursts which in certain years seems to seize the climate, both of eastern Cuba and northern Santo Domingo. As a rule, the rainy season begins about the middle of June and continues till late in September or that part of October when lucky Colon realized the dream of his life, and for the next ten weeks had cause to consider the climate superior to that of the Andalusian garden lands. But there are summers when the American colonists hesitate to aggravate the temperature of the national holiday with fireworks, and when heretics and true believers have to combine their prayers for showers enough to save the pine-apple harvest.

In such years droughts or dryish sultry weather may continue to the end of July, but before the middle of August Nature evinces a disposition to make up for lost time, and monstrous thundershowers occur day after day, till the roar of the sierra brooks can be heard from a distance of several miles. And the land's appetite for these potations appears to grow with every indulgence. The first sensation of drowning is said to be pleasant, rather than otherwise, but that rule admits of an exception in the case of a wanderer caught in a Cuban *chorasso* and feeling his influenza-resisting ability yield to the persistence of the merciless shower bath till the remains of his vital vigor flicker on the verge of extinction. Yet, during the intervals of these celestial waterfalls the atmospheric condition may not appreciably differ from those of other years; the same cool nights, the same mist-dispersing land winds and balmy mornings; warm but breezy forenoons, the cooling sea wind subsiding about 11 A. M.; then clouds and boding thunder growls. At 2 P. M. the thermometer may indicate 95° in the shade; the exact average of normal years at that time of a summer day; but again the extravasation of moisture, which, according to the rule of averages ought to be limited to a good, brisk shower, will come in the form of a deluge. After four or five weeks of such excesses the weather does begin to recover its temper, and a peculiar cool vapor, hovering about the drenched woodlands, seems to counteract the formation of waterfall clouds, the noonday hours still grow sultry, and thunder mutters its warnings on general principles; but the natives decline to stampede; experience has taught them that the wrath of Nature has been propitiated, and that the peril of atmospheric dam-breaks is over for that year.

Torrent summers occur about once in four years, and while they last the discomforts of travel in the interior of Cuba can hardly be exaggerated. The railroads of the coast plain have become bayous,

and mountainward tourists need their water boots in every glen; the gnat veil of ordinary years has thickened to heavy banks of gnat clouds, and the nights are made ghastly by the serenades of renegade tomcats that have exchanged the shelter of their native ranchos for the freedom of the woods, but have to wait for the cloud-dispelling moon to celebrate their declaration of independence.

The supposed rain-attracting excess of heat has, however, nothing to do with the intervention of rainy summers. In the western provinces, where rain is often sorely needed, they are rare—much rarer, at least, than in the wood-covered southeast. Their recurrence seems somewhat to depend upon the above-mentioned cold-air waves from the woodlands of Central America, cool weather in June having a tendency to postpone the beginning of the rainy season and to increase the vehemence of the eventual downpour. In other words, the early showers of Yucatan and of the West Indian Islands are apt to occur in alternate years, but there are summers when cloud bursts break out without any other premonition but the steadily increasing sultriness of the weather during the latter half of July.

Hurricanes are still harder to predict. Experience has proved that they are generally more frequent in Santo Domingo and Porto Rico than in the western Antilles, but the occasional destructiveness of their rage in Cuba is attested by numerous *cadenzas*, or tracts of leveled forest lands, from Santiago to Pinar del Rio, and their genesis is still rather obscure. As a rule, the equalization of extreme contrasts of temperature is attended with violent gales, and in early spring northwest storms, traversing the mainland from Hudson Bay Territory to southern Texas, may approach the threshold of the tropics nearly a hundred degrees cooler than the atmosphere brooding over the coast plains of San Salvador, where pears begin to ripen in April. And the fortnight following the vernal equinox is really a season of shipwrecking gales, in east America as well as in western Europe and the Asiatic coast lands of the North Pacific. But the tornadoes proper, the wall-breaking and tree-uprooting whirl storms of the West Indies, are more frequent in August than in April, and may even assume their most portentous forms in September, when the summer sun at last prevails against the mists of the rainy season, and the *vegas* are some twenty or thirty degrees warmer than the Texas prairies—a mere trifle compared with the contrasts of early spring.

Moisture would seem to play almost as important a part as heat in the generation of cyclones, and Professor von Tschudi called attention to the fact that the dry if not wholly rainless coast regions of Peru enjoy a remarkable immunity from destructive storms.

Cold winds become afflictive only on the highest plateaus of the

West Indian sierras, and could be made to serve a sanitary purpose in the *valles ventosos*, or wind gaps of the Cuban coast range, where the eastern trade wind pours as through a funnel, all the day long, for at least eight months out of twelve. The half-wild cattle of the uplands wander miles to seek the air currents of these glens in midsummer, and can be seen standing motionless, facing due east, like orthodox Mussulmans, to enjoy the blessing of refrigeration, while the air of the grassy table-lands round about trembles under the rays of a vertical sun.

On the crest of the Sierra Maestra, at an elevation of nearly eight thousand feet above tide-water, winter winds become chilly enough to discourage permanent settlements, though herders camp there at a safe distance from the showers of the rainy season; but more grievous than any kind of air in motion are the *ahogassos*, or spells of stifling calms, which in early summer often continue for days together. The afternoon heat becomes insupportable on such days, at least to foreigners, who crowd the verandas of the seaport hotels, plying their fans with desperate energy, while the indolent creoles hang in their hammocks, trying to counteract the feeling of discomfort with nicotine fumes.

SOME PSYCHICAL ASPECTS OF MUSCULAR EXERCISE.

By LUTHER GULICK, M. D.

IN the studies that have been made in physical training in this country, the standpoint taken has been almost exclusively physiological. It is my conviction that, while physiological considerations must have a prominent place, psychical considerations will prove more definite, tangible, and important guides as to the nature of the physical training that should be given to children.

The subject under discussion is rather a new one. I have chosen, therefore, to treat one division of it at greater length than the others. A complete statement of any one of the six heads of my paper would involve extended investigations that have not yet been made. All that I hope to do now, even upon the one subject to which I shall give most space, is to indicate the importance of the problems, the directions in which solutions may be sought, their relations to physical education of children, and the kinds of material that will give us the larger notion of physical education. I shall leave till the last the discussion of the play instinct to which your chief attention is called.

1. What is the nature of muscular force? What relation does

this have to psychical force? The modern view of physiology demands that we shall interpret the beginnings of every activity of the individual in terms of protoplasm. It is difficult at first sight to understand the relation between the muscle cell and the gray cell of the brain. It is not so difficult, however, when we remember that both were originally undifferentiated protoplasm, having common properties: both were able to contract, and both to co-ordinate. Gradually the one cell specialized so that this contracting function superseded and dominated all the others, while in the other case it was the co-ordinating or directing or automatic function that was given the first place. Whatever of vigor there was in the original protoplasm we find in the specialized cell of the adult body. Vigor is at bottom one thing, and we find that vigorous psychical force tends to be found in the same individuals in which vigorous physical force is found. When an undifferentiated bit of protoplasm contracts—as, for example, an amœba—what happens? This is the simplest term of muscular contraction. All we can now say is that the mass does not change, the total volume remains constant, the ultimate particles rearrange themselves. This may be done so as to overcome resistance, and thus becomes work. That these particles should be able to arrange themselves, in opposition to mechanical force exerted upon them from the outside, indicates that there is something besides mechanical force within the cell, something besides physical force. It can hardly be regarded as mere chemical force, for in the case of many of the lower forms of even single-celled organisms there is a high degree of adaptation of means to ends, indicating psychical activity. To work out this relation of muscular to psychical force would, I think, throw light upon some of the interesting questions as to why some races are fitted to survive and others are not; as to why weak-minded individuals are so often those with flabby muscles; and as to why there is such a close connection between vigorous doing and strong willing. These matters are related not merely to the individual, but to the whole race, and, indeed, to the whole series of which the human race is but a part.

2. Of how much importance is physical exercise in the development of the brain? The modern school of psychologists tell us that from one third to one half of the brain surface has muscular functions; that this great fraction of the brain is concerned with making muscles contract, each little spot being concerned with its own muscle or group of muscles. This does not prevent these parts of the brain being also used in other ways. This we know less about. We do know, however, that it is necessary to have muscular exercise of any group of muscles, if the corresponding nerve center is to be developed. Careful examinations have been made of the brains of those who had

very early lost a limb, and it has been shown that those brain centers that normally would be active in the management of the muscles of this limb were never developed. In order, then, to the full development of the whole motor area of the brain, there must be a rich and full exercise of the muscular functions of the body. Not merely must each muscle become powerful, but the faculties of co-ordination and control must be developed. These appear to be even more related to the finer organization of the nerve structure than does the exhibition of power. We are accustomed to speak of the hind brain as largely co-ordinating, the mid-brain as largely motor, and the front brain as probably inhibitory. I am inclined to think that investigation will show that not only the hind brain and the mid-brain, but the inhibitory brain as well, are related to muscular control; that the path toward perfect control, including inhibition, is the path of perfect control of muscle, the inhibitory centers themselves are related to the control of the muscular centers, or the muscles themselves. There are some nerve centers having to do with muscular contraction that ripen without ever having the muscles concerned in active operation. For instance, the respiratory center: the newly born baby finds both his neural and muscular respiratory apparatus in perfect condition for operation. It may be that when a sufficient number of thousands of years have passed, the whole brain will be in the condition that the respiratory and a few of the other brain centers are now. Physical education then will be nil, and we shall look to physical exercise merely as a hygienic measure to insure health, all the neuro-muscular mechanisms ripening and coming into perfect function through the inherited discipline furnished by countless generations of ancestors. In the present day, however, varied muscular exercise is an absolutely necessary element for the development of the brain, and upon the right development of the brain is dependent the large bulk of our psychical activities.

3. The subject of fatigue must interest all physical trainers. Muscular fatigue, as we usually speak of it, is our consciousness of the partial exhaustion of the motor centers of the muscles that have been worked. It is thought that we do not often experience in ordinary life genuine fatigue of the muscle cell. This is not the only form of fatigue. When certain brain centers are fatigued, we can then turn to other centers, centers concerned with the operation of other muscular groups, and operate them. When these are fatigued we can turn to still others, but, long before there comes the exhaustion of the motor elements for all the muscles, there is another fatigue that supervenes, so that muscles that have not been concerned in the activity can not be operated with either power or accuracy. I do not believe that it can be shown that this is due merely to the pres-

ence in the circulation of the fatigue stuff produced by the exhausted muscles, or other nerve centers, although this is undoubtedly an element. If we call this will *fatigue*, it then becomes of importance to find the point in the training of the muscular system at which the maximum benefit to the physical organism can be secured without appreciably lessening the power of the individual, as shown by his willing ability. To use a less technical illustration: I may direct my mind to mathematics until it is fatigued; I may then turn to philosophy, and then to music, and so forth, but before all the abilities of the mind have been exhausted there is the fatigue of something that is back of all this. One may call it fatigue of the attention, or of the will, or, with Marie de Manaceine, a fatigue of the consciousness.

Most of us know in a practical way that there is such a thing as fatigue of the emotions. The relationships of these forms of fatigue to neuro-muscular fatigue will give us important light upon the subject of educational gymnastics. We have one evidence that these forms of fatigue are cerebral, even if not psychical—the fact that when muscles are operated by automatic centers the amount of expenditure can be vastly increased without fatigue—but when the consciousness must come in and either enforce or inhibit or alter in any way the automatic process, fatigue is greatly accelerated.

4. Muscular exercise is definitely related to the hygiene of the brain. That part of the nervous system that has to do with the control of the circulation of blood—the vaso-motor system—has been characterized as "the hub about which organic life revolves." It is certainly true that whether in the domain of intellect, feelings, or will, alterations in the circulation of the blood in the brain as a whole or as parts, and in the circulation of the blood in the viscera, are made. Our higher faculties appear to be related, not only to the brain, but to the sympathetic nervous system, having to do with the vaso-motor apparatus. The facts have been established that it is only in connection with exercise that the whole circulatory apparatus, as well as the vaso-motor system, comes to its full development. The balanced distribution of the blood to the body is definitely related to the power and regularity of the heart, and to that vaso-motor education that comes in connection with varied muscular contraction. In this field, empirical knowledge has gone far ahead of scientific investigations.

There are, however, simpler aspects of the relation of muscular exercise to the brain hygiene. The quality of the blood is directly affected by exercise and breathing. Deep breathing is promoted by exercise. The demand for oxygen and its supply in the system are both increased by oxygen. The power of the heart, and the healthy

tone of the venous system, are both related to a moderate amount of muscular exercise, and these are all largely facts in the hygiene of the brain.

5. Muscular contraction appears to be closely related to the genesis of all forms of psychic activity. Not only do the vaso-motor and muscular systems express the thinking, feeling, and willing of the individual, but the muscular apparatus itself appears to be a fundamental part of the apparatus for these psychical states. Without the muscular system, material for psychic activity can not be secured. All three of these processes—thinking, feeling, willing—are more or less remotely connected with a rehearsal in the body, both neural and muscular, of the acts by which the original material for the mental process came in. As President Hall puts it, we think in terms of muscular action, more or less remote, and all the parts that were concerned in the original activities are more or less active in the thought. Nerve currents are constantly going to muscles and coming from sense organs, all being a part of the thinking apparatus. If this is true, the fullness of the neuro-muscular experiences during early life would appear to be related to the opportunity of later psychic range. This is borne out by the fact that both in animals and in men, taken at large, the scale of intelligence corresponds to the scale of wideness of range in muscular co-ordinations. The more complicated the neuro-muscular apparatus, the higher the intelligence. It is true that in the individual life we profit mainly by our racial inheritance of all these complicated mechanisms, but even here we may expect to find that the individuals who live a rich psychic life have been, on the whole, those who during early life have had the rich and full experience in regard to muscular co-ordinations. It is not, however, merely in terms of intellect that the muscular system is important. The sensibilities, or feelings, or emotions, are definitely related both to muscular and to visceral states. We are accustomed to think of the expression of the body, particularly the expression of the face, as merely the outward manifestation of the inward state. The modern psychology, however, is telling us that this muscular contraction is a necessary part of the feeling itself, and that where the muscular expression of the feeling can be inhibited, the feeling itself is not the same. Rage is not rage until it expresses itself in muscular action of some form. It may be merely in the stiffening of the whole body, the clinching of the hands, or holding the jaws firmly together. Here, again, do we find the richness of feeling associated without exception in races with a fine development of the neuro-muscular and vaso-motor systems. This is related to muscular exercise. When we come to the regal faculty, the will, our modern psychology again tells us that will must express

itself in terms of muscular activity, and that power of the will in its origin bears a relation to firmness of muscle, to power of muscular contraction.

In passing rapidly over these large subjects, I am aware that I can do nothing more than to suggest the larger outlines upon which we must work for years before securing satisfaction and final results. My immediate attempt is to put in these terms of physical training the conclusions and inferences that the modern psychology has already laid at our doors.

Your attention is particularly called to my next subject. I believe that we shall find in the play instinct a clew that shall lead us to a rational plan of physical education—a plan that will fit in as an integral part of the present-day educational movement.

6. *The play instinct.* By the play instinct, I mean that which prompts the young child or animal to its chief activities for the first part of its active life, as well as to those activities to which adults turn for recreation. Play is associated in the child's mind with fun, and with independent activities. The more the play is controlled and demanded of the child, the less is it play and the more is it work. It is the child's self-activity; it is the free operation of his own will or fancy; it may demand all the muscular and mental qualities of work, but it is not work so long as the child is free. The reactions of the individual vary much in free activity from what they do in enforced activity. My father used to remark upon the quick fatigue that would overtake me when laboring with a hoe, and the endurance that I had when operating with a baseball bat. This problem has been too much for most parents. The voluntary control of the will in the one case is an entirely different matter from the free play of both will and attention in the other. As soon as activities are done for profit they are no longer play, although they may be enjoyable. When an adult exercises for health, he is not playing unless there is the spontaneous enjoyment in it that is characteristic of play, and which makes it appear worth while for its own sake.

Let us ask first in regard to the facts of play. What are the plays of childhood and youth? Do they form a logical and coherent whole? Is there any orderly progression? If so, whence do they start, and to what do they lead? The facts which I shall give under these heads are drawn, first, from an observation of my own five children; second, from my own experience as a boy; third, from observation of the children of Springfield; fourth, from a study of the plays of English preparatory schools; fifth, from an examination of boys' books; sixth, reports of child study, in regard to infant activity.

For convenience, I shall divide the life of the child into periods. Hard-and-fast divisions can not be made, not only because they do

not exist, but because children vary so much—some are precocious, others are slow. All that is attempted is to have years in which it is possible to recognize certain great groups of activities. In this classification, it must be remembered that each group includes all the preceding. The individual loses nothing as he grows. Everything that he has acquired remains to him as a joy and a recreation if it is in the right relations. The baby will play with sand for hours, making marks with his fingers, picking up a handful and letting it trickle out. Such simple plays as these never lose their interest. I have watched individuals sitting on the seashore playing with the sand for an hour at a time; so that when I shall attempt to define the plays of adolescents, let me not be understood as meaning that these are the only plays of adolescents, for adolescents do all that the preceding groups have done. That which I shall attempt to describe will be the plays that the adolescents have that are not found to any particular extent before adolescence, and which may thus be called characteristics of adolescence.

The divisions that I have made are: (1) Babyhood, approximately from birth to three; (2) early childhood, three to seven; (3) childhood, seven to twelve; (4) early adolescence, twelve to seventeen; (5) later adolescence, seventeen to twenty-three.

It is evident by this time that I am using the word play in a broad sense, including games, but not limited by games. I do not care to discuss the whole subject of games, but am concerned with those that involve muscular activity and co-ordination.

How do babies play? They love to rattle paper, to take hold of things, to muss paper up, to pick things up and drop them, watching the result, to roll a ball, to push and pull things around with their hands; they delight in playing with sand and dirt, and stones, and bugs, toddling after the hens; they delight to splash water, and many other such simple activities. They all seem to care for anything involving accurate muscular co-ordination.

During early childhood—three to seven—children enjoy building with blocks. At first the buildings are simple and regular—the blocks stood up in rows more or less equidistant The idea of regularity appears to be definite, but little idea of symmetry until the latter part of this period, and then I suspect that it is the copying of older children. Children enjoy swinging, are fond of climbing, will climb low trees, will climb chairs, will climb banisters, experiment with jumping from chairs, with jumping from steps. All our children have gone through a stage of wishing to cut things. The attachment for dolls comes in the latter part of this period among girls. We started with the idea that, until puberty, boys' and girls' minds were just alike except so far as they were trained differently by their

parents. Wishing our children to have vigorous, robust bodies, we endeavored to have them live the kind of free life lived by boys, and gave them no dolls, but the instinct of the girl turned to dolls like a needle to the pole. There is nothing so fascinating to them as dolls. The doll life during this period is not complex. Such simple plays as "patty-cake" come soon after three, dissecting maps and such things a little later, "drop the handkerchief" later yet.. The child is immensely inquisitive, and wishes to find things out. Its play is much influenced apparently by this feeling. I do not think that the destructive play of boys at this period is merely destructive; it is related to the acquisition of knowledge and the construction of other things. Children are interested in but not sympathetic with animals and bugs by Nature. They will play with flies, pulling the wings off to make them tame, and many other things, indicating a total lack of appreciation of the suffering of animals. Children before seven rarely play *games* spontaneously. They do so sometimes under the stimulus of older children or of adults. The same fact may be stated in regard to competition. The plays before seven are almost exclusively noncompetitive. Comparing the plays of this period with those of babyhood, I would say that they were far more constructive, far greater in range; that the muscular movements involved were larger, more powerful, more sustained, but still of much the same character. Unless influenced by adults, there is but little fine work with the fingers and wrists, not very much of delicate co-ordination. The movements are the larger movements of the trunk, shoulders, and elbows. It is a time of great activity. There is but little sitting still, or keeping still, when awake.

During what I have called later childhood—from seven to twelve in girls—we have the height of the doll plays, elaborate housekeeping arrangements. Two of our children are now in this stage. They have secured all of the broken dishes, bits of tin, and other things that can be used for housekeeping, and in old boxes, in imaginary houses, or whatever is available, are going through with these elementary housekeeping arrangements. At about ten the interest in dolls seems to wane, but taking its place there is an interest in babies. It is a common thing to see girls at this age asking to borrow neighbors' babies to wheel them round in baby-carriages, to play with them, to swing them. Every one of our babies has been borrowed by neighbors' children of about this age. Boys do not borrow our babies; it is distinctly a feminine instinct to play with babies. Boys want knives, to whittle, all sorts of plays with strings, flying kites. The ball games are played, "one old cat," an elementary baseball game, swimming and rowing. Boys delight in the use of tools during this period, and in building all sorts of things; making little streams

and dams, paddle-wheels and boats, simple machinery of all kinds. Many games are now played: "duck on the rock," "black man," "blindman's buff," "crokinole," "croquet," "leapfrog"; simple feats of all kinds, turning somersaults, rolling over backward, marbles, "mumble the peg," "prisoner's base," "puss in the corner," "tiddledywinks," "touch wood." Girls play some of these games: hunt the handkerchief, many games in which the circle is used, one individual running inside or outside, hide and go seek. These games are almost exclusively *individualistic* and *competitive*, forming a strong contrast to the plays of early childhood. The distinction between girls and boys in the plays of this period is marked. Boys play games in which competition is more intense, muscular co-ordinations more accurate, and the constructive work more definite and logical.

During early adolescence—from twelve to seventeen—is preeminently the group game period: baseball, football, hare-and-hounds, hockey, lacrosse, basket-ball, all sorts of tournaments. It seems to be the age for the formation of gangs. Boys love to play Indian; they have their "pals"; play robber, and sometimes act it. The predatory instinct develops early in this period. Most boys steal apples or watermelons, or something of the kind, not because they want them, but because of an inherent demand. It is a special period for the love of outdoor life; camping out appeals to the boy strongly; to build fires. He now enjoys fishing. He is possessed with a great desire to hunt, to fight Indians, and to discover the north pole. Adventure of all kinds fascinates him. His spontaneous reading reflects these same plays. Stories of chivalry, of adventure, of discovery, fascinate him. He loves animals often—some particular dog, or cat, or horse. He favors strange pets. If he has the opportunity, he will probably have the "hen fever," or something analogous, and a garden that he will take care of with great diligence for a little while. This is a large group of plays. Two elements seem to predominate: (1) that the plays are predominantly team games, in which the individual is more or less sacrificed for the whole, in which there is obedience to a captain, in which there is co-operation among a number for a given end, in which the play has a programme and plan. The second characteristic is, the period, with reference to its place, seems to be all of savage outdoor life—hunting, fishing, stealing, fighting, hero-worship, adventure, love of animals, etc. This characterization obtains more with reference to boys than to girls. I have not studied the plays of girls for this period.

During later adolescence—seventeen to twenty-three—there is a development of these same plays and games, but they are sufficiently different, so as, I think, to warrant making a separate group of them. The plays are pushed to the limit of endurance and strength, as they

are not during the earlier adolescent period; they correspond more to organized savage warfare—for instance, college football. There is a depth and intensity about it that older people can hardly realize, unless they have themselves been through it. It seems to be a real thing, and not merely a game. Wrestling, fencing, and boxing have their chief attraction during this period. The whole nervous and muscular apparatus having been fairly well constructed during later childhood and early adolescence, is now tested and knitted together with vigor and given endurance and staying power.

Comparing now the three major groups—early childhood, later childhood, and adolescence—it appears that the plays of early childhood are individualistic, noncompetitive, and for the accomplishment and observation of objective results. The plays of later childhood are individualistic, competitive, involve active muscular co-ordinations and sense judgments. The plays of adolescence are socialistic, demanding the heathen virtues of courage, endurance, self-control, bravery, loyalty, enthusiasm, and the savage occupations of hunting, fishing, swimming, rowing, sailing.

How do we account for this group of phenomena, this orderly, progressive, intense series of activities of children? There appear to be four theories: (1) That of Spencer. He says that play is the superfluous activity of the cells of the body; that it represents the expenditure of that force that is not demanded by either growth or by labor. This, it appears to me, is insufficient, because feeble, exhausted, or sick children play. Children will play often when the muscles involved are so nearly exhausted that they can hardly be made to contract, when there is evidently no superfluous energy present. This theory will not account for the definite, progressive character of the plays of childhood. (2) Professor Lazarus says that play is the aversion to idleness. The question is at once suggested, Why should we object to being idle? This, like the preceding, may be true, still it is insufficient to explain the facts. (3) Mr. Karl Gross, in an elaborate study of the plays of animals, advances the theory that plays are prophetic—that is, that the young rehearses the performances that it must do when full grown. He accounts for the strength of the play instinct by the fact that those animals that have played in this particular way, rehearsing the activities of adult life, have been better fitted to perform these actions during adult life, and have thus survived the others. The theory appears to me incomplete. In civilized man the plays of adolescents and children rehearse the activities of savage man, not of the adult civilized man. This theory would fail to account for the orderly progression of the plays throughout child life. It would not explain the enjoyment of the adult in play. It does not attempt to explain the reason why play is fun.

The theory itself appears to be at variance with our modern thought of psychology. (4) There is a special group of plays, particularly among adults, that Professor James claims as being a development of the æsthetic feelings. They consist of ceremony, of the dance, of gorgeous rites and festivities. It is the individual's share in the collective life, as James puts it. We find these both in animals and men, but they are hardly the side of play that we are discussing. (5) Different writers on psychology, particularly James, have advanced the idea that plays are genetic. We are familiar with the thought that the body, in reaching the adult stage, must briefly rehearse the history of the race. The body starts from a single cell, and with greater or less faithfulness travels the road to adult life that the race has traveled. I do not know of any scheme of physical training that has been deliberately founded upon this conception of the genetic psychology. It appears to be not only true that the body rehearses the life of the race; it appears to be true that the mind must do so also, and that the plays of children are the rehearsal of the activities of the race during forgotten ages—not necessarily the selfsame activities, but activities involving the same bodily and mental qualities. Putting it exactly, play is the ontogenetic rehearsal of the phylogenetic series. It could not be true that our savage ancestors should have depended for their livelihood upon such a game as "one old cat," that boys play during later childhood, but it is true that their lives depended upon the quick-sense judgments, the ability to strike with rapidity and vigor, the accurate muscular co-ordinations, the spirit of individualistic competition that characterizes the child play during this period. Many of the plays of adolescence, on the other hand, certainly represent the identical occupations of our far-removed ancestors, and the play of adult life when fulfilling most perfectly the conditions of play, expresses itself in these elementary forms: hunting, fishing, sailing, swimming, mountain-climbing, and the like.

Why should there be fun in connection with play? We are accustomed to associate pleasure, partly at least, with the discharge of the highest function of which the individual is then capable. I believe that upon this ground the fun of play can be explained. It represents the deeply founded functions of the race. During play the child experiences the deep satisfaction of living through and satisfying these elemental, racial functions.

Plays are progressive, and that which is the greatest fun at one period is not the greatest fun at another, because the life itself is progressive, and, while play is interesting to adults, normally developed individuals should find their chief enjoyment not in play, but in the discharge of the higher functions of present-day living. Recreation will be found by reverting to the more perfectly organized cen-

ters that have to do with the simpler occupations of preceding generations.

How important, then, is play! I attach to it great importance, for in order to live out the fullest life it is necessary that the individual go through the life of the race; without play it is not possible to achieve full-orbed manhood and womanhood. It is an interesting fact—of which, however, I do not know any scholarly investigation having been made—that the plays of the children of any given race are related to the complexity of the life of the race—that the children in highly civilized races have a far higher play life than do those of savage life. The plays in civilized lands certainly last during a greater number of years; there is more to rehearse than there is in the savage life. Not only is the period of infancy prolonged in civilized life, but we have already crowded back into comparative youth those plays that do not come to savage children till later.

Adults who never played as children are woefully handicapped in many directions—handicapped by the inability not only for recreation, but for many of the psychical activities that enrich life. My own father played but little as a boy. During later life he tried to play, but it was work. It was pathetic to see him try to play lawn tennis. It was easier and more agreeable for him to study Sanscrit than to bat a ball over a net. His hands were never trained to all the nice adjustments involved in the use of tools. He never understood mechanical things, and this I believe was somewhat related at least to his not having, from the years of seven to twelve, the kind of plays that I have spoken of as belonging to this period.

Play during childhood and adolescence represents the form of activity that alone can secure a whole-souled later life. Play is spontaneous, whole-hearted, from inner not from outer causes. It is the poetic or creative in the individual at work. Duty can never secure the same work that play can from a child. This spirit is the true spirit for life. So long as one is driven by outside forces, by the consciousness of duty, the whole self is not engaged. But when one's work is done in the play spirit, with the enthusiasm and delight of the plays of childhood, then we have the fullest development of and product from the adult. The capacity for this appears to be related to the play life of childhood and youth. To love one's work better than any other occupation, to go into it with all the play spirit, is indeed to be a poet in one's own line. What relation do the facts of which we have been speaking bear to the physical education of children?

The development of the brain may be assisted and helped much by such manual training as is now being done in some public schools. Quick sense perceptions and rapid co-ordinations demand plays and games and *places for them*. The child is going through the out-of-

door stages of the race. The sedentary life does not call for the development of muscle, heart, lungs, bones, viscera, and brain. This must come to the individual as they come to the race. The rational system of public-school physical training will provide not only for the physical development that comes through formal gymnastics, but it will put in the foreground the development of the play instinct. We shall see that the right of natural order is adhered to in the gradual unfolding of the individual in its plays and games.

With speech and writing we have means of perpetuating and communicating knowledge that enables the race to progress far faster than was possible when each achievement was won only when it became incorporated into the neural structure of the race. With the increasing sum of knowledge that seems necessary for the adult, it is becoming increasingly difficult properly to fit the youth for life. We must crowd the studies back into earlier and earlier years. This education we may call organic. I plead for the old organic education, somatic development. This superorganic education is of no avail unless the individual has those inheritances from the race that fit him to live. Muscular activity and play form the fundamental basis of the psychical nature; and yet both of these we seem to be trying to crowd out. Our beautiful cities are growing up without playgrounds, and yet there is nothing in all the world more dear to us than the wholesome development of our children. We demand that children shall sit still in school; this seems necessary, but it would be quite possible to secure all the results of the superorganic education, and to have at the same time children who have their right and full development, through play and muscular training.

It seems to me that this matter of play is related to the deeper problems not only of education and psychology, but to religion and sociology as well. Our schools may train the intellect, but the great bulk of the training of the will and feelings, both of which are higher than the intellect, receive their chief development through play.

Muscular activity may not be so important for adults, but it is fundamental in youth and childhood. Civilization—city life—is taking away both muscular work and play.

What will America do for her children? How much are wholesome, wholly developed children worth?

A FRENCH ecclesiastic recently, in one of his sermons, told what he said was an authentic story of Le Verrier, that when one of his friends, congratulating him after the discovery of Neptune, remarked, "You are very near the stars, my dear friend," "I hope," replied Le Verrier, "to get farther than that; I expect to go to heaven." Le Verrier was an earnest Christian and profoundly spiritually minded. He is said to have had a large crucifix placed in the instrument room of the observatory.

THE EVOLUTION OF COLONIES.

By JAMES COLLIER.

IV.—THE LAW.

IT is the great unquestioned addition to Darwinism made by Haeckel that the history of the embryo is shown to recapitulate the history of its ancestral species. As stated by Haeckel's authorized expositor, Mr. Lester Ward, the law has a fascinating simplicity. The development of successive species being the mechanical cause of the development of the embryo, every transmutation undergone by the former in the course of ages is passed through by the latter. From the primary cell onward, the successive species are faithfully reproduced by successive stages in the growth of the embryo. Man is thus first of all an amœba, he advances to the humble condition of a worm, is transformed into a lamprey, grows into a kind of fish, is fortunately only a bit of a reptile, is promoted to be a marsupial, a lemur, an ape, a man-ape, before he emerges in distinctly human form. So far, Haeckel. Other naturalists find the parallel more complex. In no case, according to Prof. Henry Drummond, is the recapitulation of the past complete. "Ancestral stages are constantly omitted, over-accentuated, condensed, distorted, or confused; while new and undecipherable characters occasionally appear." Haeckel has no difficulty in accounting for these new and undecipherable characters. They are the priceless records of formerly existing but now extinct species. By their aid we can recover the vanished past. It was a wonderful feat when Kant predicted, from certain disturbances in the planetary orbits, that the planet Neptune would one day be discovered. It was a great thing when Owen was (rightly or wrongly) believed to have reconstructed the moa from a thigh bone, or when from a few small molar teeth found in Germany and North America two lost species were built up. Haeckel has shown a still more daring exercise of the scientific imagination in confidently assuming the existence of species of which no trace has ever been found. Of the twenty-one species between the moner and man nearly one half are hypothetical. Not even their fossil remains have been discovered. But the German idealist betrays no doubt of their reality. That they are vouched for by answering stages in the growth of the embryo is evidence enough. In at least one case later research seems to have vindicated his prevision.

The analogy is strictly limited to species in the line of descent. No creature is the inheritor of the whole pre-existent organic creation. Man himself, the crown of Nature and its lord, is heir to only three of the seven animal subkingdoms. Never having been a

vegetable, from one entire kingdom he is altogether cut off. Nor was he ever a zoöphyte, a mollusc, a fish, a reptile, a whale, a carnivore, or a rodent, and the palpable moral and physical characteristics of certain of these species which are plainly inherited at times by man (for who has not made acquaintance with the human mollusc, or come into unpleasant contact with the tiger, wolf, fox, ox, or dog type?) may be explained as reversions to species which the human pedigree just touched as it skirted their base.

Lastly, it is consistent with the analogy that the embryo should sometimes outstrip its parent species. Each generation being an advance upon its predecessors, each new embryo must possess new potentialities of development. Even in apparently stationary species there will usually be a capacity of adjustment to changed circumstances.

In the parallelism between the embryo and the species lies the key to colonial evolution. The genesis and growth of each colony repeat the origin and development of its parent state. There is again, no exact reproduction. Much in the history of every country belongs to what we call the chapter of accidents because we have not yet found its law. This may or may not be reproduced in a colony. There is also a good deal in the history of every colony determined by local circumstances. For all such it would be in vain to look for an analogue in the mother country's development. On certain lines the analogy conspicuously fails in appearance, but even on these there will always be discoverable traces in the new of the corresponding stages in the old country. In others it would be a mere academic exercise to trace fantastic resemblances. None the less is it true that up to the point in the growth of a colony when it ceases to be dependent on its metropolis the political and social evolution recapitulates in a few years the entire evolution which the mother country may have taken centuries to accomplish.

Colonial history will thus reflect light on national history, and national history profoundly studied will make colonial history luminous. What would not a Mommsen or other reconstructor of ancient civilizations from often enigmatical inscriptions on chance-found stones have given to discover such a wealth of material in the correspondence of Romans and provincials, in dispatches, books, pamphlets, and newspapers, as we possess in relation to the early foundation of colonies? In a sense he already possesses it. It is ancient history that we are studying when we peruse these modern records. The beginnings of extinct states rise again before our eyes. Obscure struggles, "battles of kites and crows," the long travail of national growth, will emerge from the dark. More than this: as the biologist assumes the existence of undiscovered species, the historian

of colonies, finding in colonial history facts which have no answering stages in the history of the parent state, will point out the lacunæ and predict that, when that history has been more closely studied, corresponding facts will be found. Only the surface of history has been scratched. Within the last thirty years the early constitutional history of France and Germany has been rewritten by Waitz, Roth, and Sohm. Yet the documents possessed by these scholars were, most of them, at the command of earlier scholars. It was the key that was wanting, the point of view that was false. So may colonial history (or may we call it coloniology?) furnish new means of reading the past.

It is necessarily only of the mother country that the colony repeats the development. The Phœnician, Greek, and Roman, the Spanish, Portuguese, French, English, and Dutch colonies are radically unlike one another in their origin and growth. Where they resemble they are but repeating the story of universal humanity. There have been agrarian agitations in New York and Australia, and Gracchi in New Zealand, but they do not reduplicate those of Rome. Nor were the tribunes of New Amsterdam Roman tribunes.

It is, finally, in perfect consistency with the analogy that the colony should often outstrip the parent state. While still dependent, it may develop institutions in advance of any to be found in the mother country, and after emancipation it may be a social organism of a higher type. The Australasian colonies have far surpassed Great Britain in the liberal character of their legislation, and in the United States the feeling of equality between man and man has gained a vigor never likely to be attained in the countries which contributed to the colonization of North America.

SERGEANT CHARLES FLOYD, one of "the nine young men from Kentucky," of Lewis and Clark's expedition, who seems to have been a very useful member of the company, died rather suddenly while the expedition was on its way, on the banks of the Missouri River, August 20, 1804, and was buried on a high bluff about a mile above the place of his death, which was named after him; while the stream next above was called Floyd's River and the opposite bluff was named Sergeant's Bluff. Floyd's Bluff is now included within the limits of Sioux City, Iowa, but has been much changed by the wash of the river. In 1857 the grave had become so exposed that the remains were removed to another part of the hill. The Floyd Memorial Association was organized in 1895 for the erection of a monument to the deceased sergeant, whose name has become identified with the history of the city, and to establish and maintain a public park at the place where he is buried; and final memorial services were held at the grave on the anniversary of his death in 1895, with several memorial addresses and a historical address by Dr. Elliott Coues, under whose direction a full account of the proceedings has been published.

YOUNG GREEK BOYS AND OLD GREEK SCHOOLS.

By FREDERIC E. WHITAKER, M. A.,
INSTRUCTOR OF GREEK AT BROWN UNIVERSITY.

FROM the little tot who cries for the moon to the Edisons and the Huxleys, from the tattooed savage to the inventor of the wonder-working telegraph, all mankind lives to learn and to transmit its knowledge. New conditions permit improved and more ingenious methods, it is true. The Egyptian conjurer with his character-written bark in pure water solution has given place to the learned physician with his thousands invested in brain and apparatus. Yet some provision has always been made for the rearing of the young. First, the mere satisfying of his wants; then a training in the arts of war; then the arts of peace, husbandry and agriculture; and at last the fine arts, oratory, painting, architecture, sculpture, and music.

Under the stimulus and guise of religion most of the humanities reached a high stage of perfection in the East; thence the torch of civilization and knowledge was borne to its empire in the West. The Indian, Persian, Phœnician, and Egyptian legacies in the course of time became the inheritance of Greece. How little Hellas improved the dowries of her elders the world can attest—her Demosthenes, the world orator; her Zeuxis and Apelles, the possessors of those lost arts of coloring; her Pheidias, the inimitable modeler; her Socrates, the logician of history; and her Homer, holding by conquest the imperial right to the kingdom of literature.

History is the story of the hits and misses of the world. The simple and early developments of education are much the same among all peoples. The problems that perplex us to-day were troublesome to the earlier civilizations, and, though the principles by which they solved them may seem to differ from ours, we are such slaves to educational aristocracies that anything that will help free us from the bonds of present jealousy and prejudice, though hoary with age, should be eagerly welcomed.

Egypt and Persia contributed most largely to Grecian learning. Egypt's portion, enriched by all the royal patronage of the Ptolemies and learned Pharaohs, came a polished gem ready for its rich setting. To the Nile-land more than to any other did this classic people owe the great debt. And yet hardly less was contributed from the Persian store—that old Asiatic education so uniquely described by Herodotus, "to shoot, to ride, and to tell the truth."

It may be interesting to know from what sources we derive our scanty knowledge of Greek schools and education. The inscriptions,

the evidence of the classic authors, and the researches of the archæologists are the sole means of enlightenment. Naturally enough, the most desirable information, the common everyday facts, are difficult to obtain.

A training of the youth, at one time military in its nature and very similar to the German system, was required of the grown-up youth or *ephebi*. These requirements were hung up in bronze or carved in stone to be read by the Greeks, not yet favored with the printing press. These announcements were continued even after the compulsory military service had been discarded and other studies had taken their place. These enactments, together with the Parthenon frieze procession, furnish us almost our only information of the Greek college system proper.

Plato and Aristotle, in their ideal "states," have given us some knowledge of a reliable nature; though we can not depend on them any more than we could twenty centuries hence on Bellamy's Looking Backward as a mirror of nineteenth-century life. In his Protagoras, however, Plato's account of the Greek boy's training is both clear and practical. The comic poets furnish us more valuable information, though party spirit and satire oftentimes make the "find" doubtful. Herodotus, Xenophon, and Pausanias yield by far the most valuable intelligence that we derive from written evidence.

The vase paintings, gems, urns, and temple friezes which the excavator of to-day is continually bringing to light in great numbers are a most sure and interesting source of information. Athens Sparta, Mycenæ, the islands of the Greek seas, and even Italy have produced many a powerful witness from their buried past.

As the education of a child begins with the very first admonition in its infancy and ends only with the grave, a few hints about the Grecian baby may not be amiss. On the fifth or seventh day the infant went through the ceremony of purification. This was called the "run-around day," because at that time the child was carried several times around the burning altar. The family on this day enjoyed a festive meal; the doors were decorated with wool for a girl and with a crown of olive for a boy. On the tenth day the young hopeful was named; a sacrifice was made, and another feast was held. At this time the infant was given presents of metal and clay, and the mother received painted vases from relatives and friends. The classic baby was not unlike that little monarch of to-day—the joy and the terror of his subjects. The mother's love was as great and the helpless innocence of the child as powerful then as now. The scene in the sixth book of the Iliad, where Hector's infant screams with fright at the fluttering plume on his father's helmet,

and the hero lays it on the ground to embrace the boy; and the affection and motherly anxiety of the Lament of Andromache, have touched the sympathy of the centuries. In Herodotus's story of the infant Cypselus, the baby's smile turns the hired assassins from murder to pity, and destroys their courage till, passing him on from man to man, they leave the child unharmed. Euripides represents Iphigenia bringing her infant brother Orestes to plead for her, though she is already doomed to the sacrifice, a more powerful appeal to the feelings than the most studied eloquence.

Whooping-cough, measles, scarlatina, and mumps are not spoken of, but that other modern necessity—sleeplessness, walking the night with child in arms—had reached a high degree of cultivation. The Grecian husband, lord of his household, relegated crying child and martyred mother to a separate sleeping room, while he slept "far from the madding crowd." The unpractical old bachelor Plato, in his ideal Republic, urges that two or three stout nurses should always be in readiness to carry about infants, because they gain so much spirit and endurance by this treatment.

The antique cradle was a flat swing of basket work, as seen in a British Museum terra-cotta relief, in which the infant Bacchus is being carried. Another kind of cradle, in the form of a shoe, also made of basket work, was provided with handles, allowing it to be carried or suspended by ropes and rocked. In the opening scene of Theocritus's Little Hercules, Alcmena uses the bronze shield of the slain Pterelaus as a cradle for the infant hero and his brother; and as she rocks the mighty arm she sings the little lullaby so charmingly paraphrased by Tennyson in the cradle song in The Princess. Nurses and governesses of native birth were often employed by the rich. The highest tone, however, had created a demand for the Spartan nurse, her treatment insuring the child the greatest physical endurance. Archytas, the philosopher, has received deserved praise as the inventor of the rattle, which has saved so much in fret and furniture.

The exposure of children to inclement weather, cold, and fatigue was as strongly advocated by the ancient pure-air enthusiast as by the modern theorist, and generally led to the same result—the destruction of the weak and sickly. Yet this outcome was not at all unpopular, especially at Sparta, where physical vigor, not intellectual prestige, was required. The custom of exposing sickly or deformed children to the wild beasts on the mountains was practiced throughout Greece, and advocated by the greatest moralists. Though the horror of the practice can hardly be reconciled to our Christian training, there is a justification, or rather explanation, all powerful, when judged by the standards of long ago. The father had absolute power of life and death over the child. The state could only in extreme

cases interfere with the disposal of the children, and then only when its interests were impaired. A strong state with mighty warriors was a more effective argument than a sickly family. Then, too, the lack of commercial pursuits among the upper-class Greeks made their seeming cruelty only prudence or at the most selfishness. Socrates, comparing the feelings of his pupils, when reasoned out of their darling errors, to the anger of the young mother when her firstborn is torn from her, furnishes almost the only adverse mention of this practice.

The time at which children shall begin school was as perplexing a question to the ancients as to us. Some educators argued that the child's introduction to books should not begin before the seventh year; the really vital point that some are too young at seven while others are too old was, as now, skillfully lost sight of. Hence the carelessness and indulgence of parents often left an unoccupied period between infancy and school days, which the boy or girl employed in sports—those unconscious educators of the young. There is hardly any modern sport that was not in vogue in ancient Greece. Hopping on one foot, top-splitting, ball playing (both with football and some systematic game with small ball), playing at king, taking prisoners, and catching the knuckle bones of animals on the back of the hand—our jackstones—busied the younger boys and girls. A game is described exactly like the modern Canadian game of "lacrosse." The real, wide-awake boy, however, indulged in beetle-flying, by means of a long thread tied to its tail, sometimes varying the sport by attaching a lighted wax taper—a game still practiced in the country and frequently the cause of extensive fires. This last game might be compared to young America's harmless amusement of tying lighted firecrackers to a kitten's tail. Throwing dice was a favorite pastime with the young as well as with the old. The best throw—three sixes—was called the "Venus" throw; the lowest—three ones—the "dog" or "wine" throw; this last throw evidently meant liquid refreshment for the company. Among the false dice in the Royal Museum at Berlin there are a number "loaded," and some on which the four occurs twice. The Italian game of *morra* was known to the ancients. The two players, opening their clinched hands with lightning speed, cried out the number of fingers instantaneously. From vase painting and written evidence we have conclusive proof that cock-fighting was indulged in by old and young. Themistocles, after the victory over the Persians, made provision for annual festivities of this sort. The birds were fed on garlic, before their fights, to increase their fierceness. Metal spurs were used, and wagers made on the result, the same as in our refined nineteenth century.

The extraordinary care that the Grecian boy received in his formative years made his moral training more effective than that inculcated by the most careful of modern parents. His general education, coupled with skillful and continuous physical instruction, produced a moral cultivation very similar and fully as strict as that the Christian father deems necessary for his daughters. A pedagogue, generally an old and trusted slave, led the boys to school and called for them after it closed, carried the books, looked out for the little boys, kept the older ones from fighting and falling into bad company, and had a general oversight of their conduct and street form. He was by no means a schoolmaster or even a private tutor, not even being allowed to enter the schoolroom. Oftentimes ignorant in the extreme, he was chosen simply because of his loyalty to the family, and sometimes, I fear, because he was unfit for any other occupation. Though the butt of the boys' ridicule, and bitterly assailed by the comic poets and low wits of the day, he did an incalculable service in preventing vicious companionships and keeping pure the minds of those intrusted to his charge.

The child was never sent off to boarding school, but boys attended the day school; town life prevailed; besides, that sentiment that zealously guarded the boy's purity with a pedagogue from his sixth to his sixteenth year could brook no intermission of personal oversight. Education was essentially private, the state having jurisdiction simply over the moral and not the professional standing of the teacher. Though the Greek as well as the Roman school opened very early in the morning, there appears to have been an afternoon session. By a law of Solon, the schools were not allowed to open before sunrise or to hold their sessions after sunset. A state fine refused admission to all except teacher and pupils; the false display of the unpractical public examination day was thus avoided. Outside of music and athletics there were no competitive examinations. The classical schoolman refused promotion for lifeless knowledge, and with keen insight into the real essentials of education demanded a *living* grasp of the subject. Every respectable town had its school. The large cities furnished their schools with all the necessities and many of the ornaments. The poorer towns often held their recitations in the open air, and when the hot weather came on took advantage of the colonnades and shade of public buildings. A similar custom at the celebrated Winchester school in England gave rise to the "cloister term."

There was always an altar to the Muses, the goddesses of learning, or busts of Mercury and various heroes, philosophers, and patriots as reminders to the boys. The master sat on a high seat; the boys sometimes on steplike benches, but usually on the ground

round about him. The schools, except in occasional cases, do not seem to have been crowded. No furniture, as desks or tables, were used, such things being unknown in the country. The universal Eastern custom prevailed, while reading or writing, the book or roll of parchment was held on the knee. Water was kept for the thirsty boys. There seems to have been but one master—seldom any assistant—who, like the old pedant in The Deserted Village, was supposed to know everything.

In the lower schools, the "spare the rod, spoil the child" doctrine was a Median article of faith. Flogging seems to have been popular, or at least in great demand, in both Greek and Roman schools; even the learned Horace, in his epistles, says, "Well do I remember what Orbilius, good at flogging, told me when I was a little boy." In many late writers the severities of the schoolmasters are noted. In one of the Pompeian pictures is represented a schoolmaster flogging a boy held upon the shoulders of a second boy, while a third holds the victim by the heels. Though the ferule seems to have been the favorite instrument of castigation in the Roman school, Lucian and Plutarch have noted the use of the sandal in both domestic and scholastic corporeal correction. The sounds of woe prevalent in satirical pieces prove that Stoicism did not prevail among the whining schoolboys, though there is no reason to suppose that the penalties were any more severe than ours of two decades ago.

To the common-school education in the most brilliant age of Athenian glory—the time of Pericles—there were but three departments; no language course, as all barbarians were supposed to learn Greek, and no true Grecian would degrade himself by studying a foreign tongue. The so-called exact sciences had not yet obtained recognition. The three R's were letters, including reading, writing, counting, and learning of the poets; music, including singing and playing on the lyre; and gymnastics, which included dancing.

Probably at home or before the child knew its letters it was taught to repeat verses from the poets. The analytical mode of teaching the alphabet, by which a word is made to represent an object and then is resolved into its component letters, was not used. The individual letters were learned, and then put together to form syllables and words, called "syllableizing." To add interest, Callias wrote his so-called "grammatical tragedy" or poetical A B C book. Each one of the letters spoke in the prologue, while the chorus combined vowels and consonants into words. With a touch of humor, it seems to me, this old versifier has made the consonants, without sound, represent the male characters; but the vowels, which furnish

sound for themselves and all the other letters, and are said to do much more talking, take the female parts. Remnants, discovered only a decade ago, prove the use of pictorial illustrations to teach young children. The subject chosen is, as usual, taken from Homer. One fragment represents the priest Chryses praying the king Agamemnon to ransom his daughter. Under the king, priest, and wagon-load of ransom we read the words "Agamemnon," "Chryses," "the Ransom." Not only correct pronunciation, but well-balanced intonation and rhythm, were demanded by the Greek ear. Reading aloud and learning the poets were great aids to this end. The children, and those who were older, were taught to recite verses from that—to them—inspired Greek Bible, Homer's Iliad and Odyssey. The Greek required his son to memorize the great masters' poems, not only as an intellectual acquirement, but as an incentive to holy living; and so thorough was the training that Niceratus can say in Xenophon's Banquet, "Even now I could recite the whole Iliad and Odyssey." Both of these books, some eight hundred and fifty pages of close modern type, are claimed to have been handed down by sheer memory from father to son. Though such cultivation seems miraculous to us, whose memory powers have been weakened by writing and the printing press, a striking example of its probability is seen in the story circulated about the romantic marriage of the rich German merchant, the renowned Dr. Schliemann. The doctor once said, report has it, before a party of Athenians, that he would marry the first woman who could recite the Odyssey. One day a fair Greek girl appeared before him, unintroduced, asked if the promise was true, recited her Homer, secured her home, and a wife's share of one million dollars.

Writing in ancient Greece was not for a long time considered a very important essential to the average man; probably being deemed servile, as the business writing was almost entirely confined to foreigners and slaves. In time, however, it came to be considered an ornament for the rich and people of leisure, though even the great orators and scholars employed private secretaries on almost every possible occasion. We must not think of the Greek boy as using pencil and slate or even pen and paper. The first companion of the schoolboy in his writing was the wax tablet—a thin, oblong board covered with wax; sometimes a single piece like our slate, and sometimes double, like the book slate of to-day. When two tablets were joined in this way they were provided with raised edges, to prevent the waxed surfaces from sticking together. The stylus was used to write upon the wax; it was a sharp-pointed instrument of metal or ivory, in shape much like our pencil, but with rounded end; the point cut through the wax, and the blunt end was used to erase and rub the wax

smooth for future service; so this combination lacked none of the advantages of the slate and pencil. The master wrote words for the boys to copy, and often held beginners' hands; the letters were sometimes cut deep in the wax, so that the boy could easily trace them with his stylus. A set of wax tablets with verses from Menander, evidently the furnishing of a schoolmaster, has been found in a grave in Egypt. One of these tablets has the approval "Diligent."

Though the tablet was cheaper and more common in daily life, both papyrus bark and the hides of animals (parchment) were used. Herodotus mentions the use of paper made of the bark of the Egyptian papyrus plant called "*Biblos*," our Bible, which not only means, from its Greek use, "the Book," but farther back in its history is the name of this papyrus plant. The stalk, about three feet long, was cut lengthwise, and the different layers of bark, generally about twenty in number, were carefully severed with a pin and afterward plaited crosswise, pressed, and perforated with limewater till the required consistence was obtained. The finest paper was obtained from the innermost layer; the outer layer was used in making rope. The use of the hides of goats and sheep was fully as ancient, and differed from the papyrus in allowing writing on both sides, while the bark paper allowed it only on one side.

Pens of split and pointed reeds with black and red inks were used on the papers. Quintilian prefers the tablet and stylus, and objects to the pen and paper, as the frequent dipping into the ink tends to distract continuous thought—apparently a queer objection, but our greatest American essayist, Holmes, in his Over the Teacups, makes the same comparison between the steel pen and the stylographic: "And here let me pay the tribute which I owe to one of the humblest but most serviceable of my assistants, especially in poetical composition. Nothing seems more prosaic than the stylographic pen. It deprives the handwriting of its beauty and to some extent of its individual character. . . . But abuse it as much as you choose, there is nothing like it for the poet, for the imaginative writer. Many a fine flow of thought has been checked, perhaps arrested, by the ill behavior of a goose quill. Many an idea has escaped while the author was dipping his pen in the inkstand. But with the stylographic pen, in the hands of one who knows how to care for it and how to use it, unbroken rhythms and harmonious cadences are the natural products of the unimpeded flow of the fluid which is the vehicle of the author's thoughts and fancies. . . . Its movement over the paper is like the flight of a swallow, while the quill pen and the steel pen and the gold pen are all taking short, laborious journeys, and stopping to drink every few minutes."

The ancient book was made of parchment; sometimes attached to a wooden roller, but more often a simple roll, whence our word *volume*, the rolled or revolved thing. The title was a small tag attached to the roller or to the parchment itself. The volumes were kept in a round box which the pedagogue carried for the boy. This arrangement of the rolls in round boxes is still preserved in the Vatican Library at Rome.

The schoolboy's arithmetic consisted of the science of abstract numbers—regarded as especially difficult and seldom acquired by the ordinary man—and the art of reckoning, common to the pursuits of everyday life. The Athenians, who had obtained a wide reputation as bankers, must have acquired proficiency in the keeping of accounts. To the science of abstract numbers is due much of the architectural excellence of the Greek temples and public buildings, whose dimensions were based on some mathematical theory, and in at least one instance—the celebrated Temple of the Olympian Zeus—multiples of seven and five have been found to be the governing principle. The boy was taught to add, subtract, multiply, and divide; though the lack of our Arabic system of notation made the operation much more difficult than now. Mother Nature, here as everywhere, taught the first lesson. The pupil used his fingers in counting, and "counting by fives" came to be the fixed expression for all counting. The units were represented by the fingers, a bent or crooked finger having a fractional significance. Our old-fashioned word *digits* (fingers) is a telltale relic of this mode of reckoning. The time-immemorial practice of counting by fives and multiples of five has survived to this day, and forms the basis of all calculation, pure and applied, and will maintain its sovereignty as long as mankind has fingers and toes.

The Greek boy made straight marks for numbers; at first five lines (|||||) meant five, and then two lines at an angle—the outline of the hand outstretched in counting that number (V); two of these angles with their vertices together (X) meant ten. The higher numbers, as the hundreds and thousands, were represented by the initial letter of the word, as in the Roman system of to-day. The abacus and pebbles were used as an aid in computations with large numbers. The abacus, so called from its resemblance to the marble slab at the top of the Doric pillar, was said to have been introduced by Pythagoras, but was probably of Egyptian origin. There were several forms of the abacus, but the kind most common in the Greek schools was, in principle, exactly like the counting-frame "John Chinaman" uses when he reckons up our laundry bill. There were several straight furrows set with pebbles, a row for each of the orders of units, tens, hundreds, and so on: at the left side of each furrow

there was a special division where each pebble meant five of its respective order. Thus 5,839 on the abacus would be—

Thou.	o		M.
Hun.	o	o o o	C.
Tens.		o o o	X.
Ones.	o	o o o o	Units.

Numbers were often represented by the letters of the alphabet; the first ten characters stood for the numbers from one to ten; the eleventh character signified twenty; the twelfth, thirty, and so on; eleven was represented by the letters for ten and one. Thus—

1, 2, 5 in the Greek notation is α', β', ϵ'; but 125 is $\rho\kappa\epsilon'$, in which

$$\begin{aligned} \rho &= 100 \\ \kappa &= 20 \\ \epsilon &= 5 \\ \hline & 125 \end{aligned}$$

$,\alpha\omega\rho\zeta'$
1897

Geometry, though advocated by the philosophers as good discipline for boys too young for philosophical and political studies, was not taught in the common schools, but became a favorite study of the university scholars. Over the door of Plato's lecture-room was written, "Let none ignorant of geometry enter here." The absence of the great number of compulsory studies which the modern boy is forced to taste, but seldom till his university course is enabled to digest, is a marked and praiseworthy feature of ordinary Greek schooling.

The importance assigned to music and gymnastics forms the most noticeable contrast between old Hellenic training and ours. Music in its strict sense was practically synonymous with culture, and not only gave color but formed the basis of the educational theory. Real music does not cease with the song or the performance on the instrument, but wields its subtle though powerful influence in making our lives in harmony or at discord with pure thought and noble action. When we speak of the influence of music we think of it as a recreation, but a pastime, indeed, which affords harmless amusements, and brings boys within the refining influence of their sisters and young lady friends, seldom anything more. The Greek thinker held that music not only had a refining influence, but that continuous playing of warlike tunes really made men warlike, and that passionate and voluptuous music made men passionate and voluptuous. The Grecian father was as particular about the kind of music his boy heard as we are about what our sons read. There are as many Captain

Kidds and Red-handed Rangers in music as in literature. Yet it is not the words, but the air or complexion of the piece, that forms the objectionable feature. The compositions of certain authors in a sad vein always make us mournful, while the productions of other artists have a melancholy spirit that brings heart-satisfying consolation in the greatest grief. One composer makes us laugh with childlike joy; another makes us weep. One brings out the divine in our nature; another brings out the fiend. Beethoven ennobles and Offenbach degrades. Though some airs are moral and others are immoral, the different effects of different music upon the mind can not be told in words, and therein consists its very danger; no explanation can be made, no warning given. "Home, Sweet Home," with its simple yet soul-stirring melody, frees men from their baser selves, and often turns them from intended crime, while the Mexican and Hungarian band music, which has become so popular of late, has exactly the opposite effect. The Gypsy bands, which at home are employed almost solely in playing for the National Dance, begin with a calm and grave measure, which, by gradually accelerated movements and flourishes, added to suit the players, at last reaches an intoxicating pitch of deliriously exciting complexities. Such music drives men to the beer gardens, not to the churches. Plato, the Grecian Moses, would have held up his hands in holy horror.

The Greek public put music under state control, as the Chinese of to-day are said to do. Though Chinese music may not be to our taste, it is at least simple and free from those eccentric ornamentations that mean danger to the youthful mind. Why should America proscribe obscene literature and exempt immoral and degrading music? The lyre was the principal instrument of school use. It was originally formed by stretching from seven to ten strings across the hollow tortoise shells which may be found ready for use in any of the Grecian rivers. It was used not only in song accompaniments, but was of special value in the reciting of the poets, giving rhythm and correct balance to the metre, and by its changing tones interpreting variations of feeling.

But the gymnasium, in our sense, is the one great respect in which Greek education for the boy differs most from ours. The Greeks, as no other nation of antiquity, believed in physical training and continuous and complete bodily development. They held that gymnastics not only meant health with its attendant happiness, but that the absence of them made the coward and the loafer. The running race was of value not only because the Greeks attacked the enemy on the run, but because the consciousness of bodily strength gives a boldness of spirit and a clearness of intellect that make hardships endurable and loyalty supreme. Sparta made physical excellence

paramount to all else; to her, strength of limb and elasticity of movement meant mighty warriors and national supremacy. At Athens physical and intellectual training were given equal attention, though brain was always superior to brawn. The national games at the great festivals, which crowned the victors with divine honors, kept religion and sports so intimately connected that obedience to the gods could not be separated from devotion to the state and duty to one's self.

Though American rush and push have made our country first in the contest of the nations, hurry may be the bane as well as the boon of our civilization. Bodily weakness and hereditary disease have followed in the wake of material wealth and intellectual vigor. Generations of overworked and unexercised men have left us the legacy of shattered nerves and enfeebled hearts; with characteristic vigor we press on till a little extra strain on this already overstrained system destroys the life that a little daily exercise might have saved for years of usefulness.

At the first school day the physical training in the *palæstra*, under special instructors, was begun, and never ceased till old age called a halt. The *palæstra* was for boys, and was purely a private enterprise, while the gymnasium was under state control and frequented by the youth and older men. No outsiders were allowed at either the boys' or men's gymnasium. Every day the boy was trained in one or more of the so-called "five exercises," which included leaping, running, throwing the discus, casting the spear, and wrestling. Bars of iron with knobs at the ends like our dumb-bells were used to aid in leaping. Before wrestling, the body was well rubbed with olive oil, to which sand was added to afford a good hold. A flesh-scraper removed the oil after the contest. Boxing, and boxing and wrestling combined, were deemed necessary only for the professional athlete, and were not taught to boys, as likely to disfigure their faces and create quarrels and ill will. Outside of Sparta we hear very little of outdoor sports, as hunting and riding, but probably owing to the fact that elsewhere Greek life was essentially "town life." Boys are always attended by overseers in their games, and seem never to have indulged in those sports in which they elect and obey their own leader and fight out their own battles. In all the schoolboy's physical training the motto was "Health, not display."

Unfortunately, the Greek schoolmaster, at least in the common schools, was neither held in high repute nor very well paid. The teacher's income depended on the number of pupils enrolled; though the tuition was probably due monthly, there was great irregularity in its payment. Demosthenes, in the noted case against his guardians, accuses them of letting his teachers go unpaid during the whole of

his minority. Lucian, in his satires, describes kings as beggars or primary schoolmasters in the lower world. A comic writer is quoted as saying, "The man is either dead or teaching the alphabet." Orators and noted men accuse each other of having followed this profession. Horace's master Orbilius wrote an autobiography under the title of "The Man acquainted with Grief." The great university teachers, however, were held in high regard, and their pay was oftentimes enormous. Though Plato, the rich *savant*, worked for love, and gave his services to his pupils, the professor's chair in late Athenian glory often paid a twenty-thousand-dollar salary. Gorgias, the great rhetorician, is said to have received one hundred thousand dollars a year for his lectures. The philosophers did not believe in bartering their bread and salt for empty praise.

When Pericles, in his famous funeral oration, reminded his Athenian hearers that their city was a school of Greece, and that the indestructible monuments of their greatness, all over the world, would make their people the admiration not only of their generation but of all posterity, he unconsciously uttered words richer in prophecy than the oracle itself; for not only did Athens become the leader of Greece, first in literature, art, invention, and social progress, but for centuries she has led the nations of the world in all that civilization and cultivation deem greatest and best. The physical, intellectual, and moral superiority which the old Greek school could justly claim as its own, though but a few pages from the history of the nation's service to mankind, formed the basis of that university system which was not only the first in the world, but was gifted with philosophers of such power and artists of such renown that every branch of science and æsthetics, which we deem so much our own, is eagerly seeking for the mystic wand which will bring to view those arts, long lost, but not yet despaired of. The chemist searching and seeking with tireless experiment for the art of tempering copper; the economist spending time and intellect on the various monetary questions; the advocate of equal rights for equal sexes; the statesman studying trade policies and race problems; and the sculptor striving by his colored statues to get nearer Nature's self, are but working out again the problems whose solution constitutes the treasures of little Athens, queen of reason, arts, and letters, and whose influence on the civilization of the future is as yet unsearchable. The ivory palaces, bright with gold, have indeed fallen to decay, but frankincense and myrrh still exhale their everlasting perfume amid the beauteous ruins.

THE FIRST HALF CENTURY OF THE AMERICAN ASSOCIATION.

By Prof. DANIEL S. MARTIN.

THE recent jubilee meeting of the American Association for the Advancement of Science, held at Boston, where the society was organized fifty years ago, is a memorable event in the history of science in this country, and is well deserving of careful notice. It has been somewhat fully treated of, indeed, in several of our magazines and leading papers, and the general aspects of it must be familiar to most of the readers of these pages. But some consideration is due to so interesting a topic from a review entirely devoted to scientific objects, and it is proposed in this article to give not only some historical aspects of the association and its half century of work, as has been done in most of the articles and addresses that have appeared, but also some suggestions as to the influence that it has exerted on the country, and how that influence may and should be increased in the years to come.

The association itself was the natural and indeed the necessary outgrowth of the earlier organization known as the Association of American Geologists and Naturalists, which held its first meeting at Philadelphia in 1840. That movement began two years before, in 1838, in the suggestion of such a body as eminently desirable, by Prof. Edward Hitchcock, of Amherst College, in a letter to Prof. Henry D. Rogers, of Philadelphia. The two brothers Rogers took up the suggestion earnestly, and, with the active efforts of Professor Hitchcock, brought together the first gathering, which was a notable one both in itself and in its subsequent results. These were foreshadowed at the very outset; the original idea was for a conference of geologists only, but the inevitable expansion was seen in the name selected, in which the words "and Naturalists" were soon added to the proposed title—"Association of American Geologists."

There were eighteen students of the science present at that first meeting, in the Franklin Institute at Philadelphia, Professor Hitchcock being chosen to preside. Among them were nearly all the men actively interested in geological studies and in the early State surveys then beginning or begun. Of that circle of founders only one remains, Dr. Martin H. Boyé, then of Philadelphia, but lately abroad. Prof. James Hall, the veteran head of the New York State Survey, and for some years past the Nestor of American paleontologists, lived to within a few weeks of the Boston jubilee meeting, and his presence was looked forward to with peculiar interest; but he was taken away

only a short time before, to the great regret of many who had hoped to see and hear him there.

At the first meeting Professor Hitchcock laid before his co-laborers in geology an account, with specimens, of the fossil foot-prints of the Connecticut Valley sandstone, which have since become so celebrated and so closely connected with his name. The next year the meeting was again held in Philadelphia, and the third year in Boston. On that occasion (1842) the brothers Rogers—Henry Darwin and William Barton—presented to the body their immortal achievement, wrought out together over a vast field, of the structure of the Appalachian mountain system. Both were then young men, but little over thirty, and had labored with true brotherly as well as scientific co-operation, Henry in New Jersey and Pennsylvania and William in Virginia. A most interesting account of their joint presentation of this memorable investigation was given in a letter from one who was present at the time, Mr. John L. Hayes, and printed in the memorial volume, Life and Letters of William B. Rogers, by his widow, published by Houghton, Mifflin & Co. After referring to the eminent men present—Dr. Morton, of Philadelphia, presiding, already becoming noted in the young science of anthropology, and the brilliant address of Professor Silliman, of New Haven, and others active in various departments of science: Hitchcock, Jackson, Emmons, of Taconic fame, "the brilliant French astronomer Nicollet, the mineralogist Beck, the paleontologist Hall, the microscopist Bailey, the zoölogist Gould, the philologist as well as naturalist Haldeman," and others, among them Mr. (afterward Sir) Charles Lyell, of England—he goes on to give the first place of interest and importance to the work of the brothers Rogers, and after describing it enthusiastically closes with the following words: "The brothers by their happy and amiable faculty of working in concert, more than duplicated their individual power. In making their joint exposition, William Rogers took upon himself the more modest but really more difficult part of describing the phenomena, leaving to his brother the part of explaining the theory. . . . Nothing could be more pleasing than the working together of these minds toward the same end."

It will be apparent to any one from these accounts of those early meetings, both their topics and their *personnel*, that there was not only ample scope for such an organization, and both need and readiness for it, but that it had in it from the first the germs of a wider association that should take in all departments of science, and give similar opportunities to all the scattered workers and students of the land. This fact soon became evident, and the idea was taken up earnestly by the Rogers brothers and actively pressed to its accomplishment. Henry D. Rogers was more prominent in the first stages of the move-

ment leading to the earlier association, while his brother William became strongly identified with the later steps that merged it in the wider organization which has now existed for half a century. For eight years the Association of American Geologists and Naturalists met as such, and then in 1848, in the city of Philadelphia, the new association, under its present name and with nearly its present constitution, took its place. William B. Rogers, the retiring president of the earlier body, turned over the chair to Dr. W. C. Redfield, of New York, the first presiding officer of the American Association for the Advancement of Science.

Six members of this first meeting are still living, two of them in Greater New York: these are Dr. Boyé, already named as the sole survivor of the founders of the previous association; Prof. Wolcott Gibbs, of Newport, R. I., the retiring president at the recent meeting; S. L. Abbott, of Boston, and Epes S. Dixwell, of Cambridge; and the two New York members, Prof. Oliver P. Hubbard, of Manhattan, long and actively connected with the New York Academy of Sciences, and Dr. Charles E. West, of Brooklyn, the veteran educator, student, and public-spirited citizen.

In reference to the place of holding the jubilee meeting in the present year, Boston and Philadelphia both had claims to the honor. It was decided in favor of the former, however, as the real birthplace of the association; because, although the first regular meeting was held in Philadelphia in 1848, yet the body was organized and its constitution adopted in Boston at the last meeting of the previous association, in 1847. Strictly, perhaps, the celebration of the semicentennial was due Philadelphia, but there does not appear to have been any other than friendly rivalry in the case; Boston was enthusiastic for it, and Philadelphia consented, and through her representative, Dr. Daniel G. Brinton, the well-known anthropologist and ex-president of the association, expressed her warm and earnest congratulations.

The arrangements for the meeting had been planned on a scale of elegant and even elaborate hospitality on the part of the city and all its institutions of science and education. Regret was expressed to the writer by a leading member of the local committee that, at the season when the Association met, so many of the wealthy and cultured citizens were absent and their houses closed that there was far less of elegant private hospitality than would have been gladly offered at a different time of the year. But this fact was really not a matter for regret, as the time of the association was so absolutely filled up with work and with the abounding courtesies and invitations from the city and its institutions that every hour during the week was crowded. One day was spent amid the classic precincts of Harvard University, and another at historic Salem; one evening reception at

the far-famed Public Library, and another at the Art Museum, gave the members opportunities of seeing two justly celebrated institutions of their kind, among the noblest in the country; another evening and several excursions were devoted to the remarkable park and water-supply systems of Greater Boston, which for scientific design and execution are in advance of those of any other American city.

In the addresses of welcome at the opening session, by the Governor of the Commonwealth, Hon. Roger Wolcott, and his Honor Mayor Quincy, of Boston, much emphasis was laid upon the public benefits, social and municipal, derived and derivable from the studies and labors of scientists, especially as illustrated in the city where they were meeting, and upon the mutual duties of the scientist and the public—the former to diffuse and extend the results of his researches for the general benefit of his fellow-men, and the latter to honor and encourage in every way the scientific laborers who had done and could do so much for society. These lines of thought will be referred to later in this article. They had a peculiar force and aptness in the city of Boston, where intellectual and scientific culture is so widely diffused, and public enterprises are so largely and so successfully carried out under scientific direction.

The meetings were held in the buildings of the Massachusetts Institute of Technology and the adjacent Boston Society of Natural History. Here, too, there was exceeding fitness. The Society had taken the initiative in planning and preparing the invitations to the association to meet in Boston; while the Institute was largely the life work of Prof. William B. Rogers, who was its organizer and first president for many years. Its two fine buildings are named Rogers Hall and Walker Hall, after Professor Rogers and his successor in the presidency, the late Dr. Francis A. Walker. Professor Rogers, after his early labors in Virginia as an orographic geologist, was called to the headship of this newly founded school of applied science, and remained there till his death in 1882. He always retained his ardent interest in the association that he had so largely helped to establish, was its president in 1876, and welcomed it at its last meeting in Boston, in 1880. The writer has a striking memory of him on that occasion, the aged scientist kindling with enthusiasm during a discussion in the section of geology, and saying that it brought back to him "the glow of a youthful worker among the Appalachian hills." A highly interesting and pleasing feature of the recent meeting was a reception given by his widow to the geological members, at which they had the privilege of seeing and conversing with her personally. The present president, Dr. J. M. Crafts, welcomed the association in behalf of the institution so closely con-

nected with the name of Rogers on the one hand, and with the diffusion and application of scientific training on the other.

A few words must suffice as to the foreign delegates and visitors who were present. Among these were M. Desirée Charnay, of France, eminent as a student of archæology in both the Old and the New World; Prof. Benjamin Howard and Mr. C. W. Cooke, of London; and Dr. A. Sasse, of Zaandam, Holland. The presidency of the association had very properly been conferred upon Prof. F. W. Putnam, whose name has been so closely connected with the history and work of the body for the past twenty-five years, as its permanent secretary; while the retiring president was, as already stated, Dr. Wolcott Gibbs, one of the six surviving members of the first meeting in 1848.

Passing over, for present purposes, any account of the many scientific papers and addresses of high interest that were presented at this meeting, we return to the history and influence of the association. It was the first national scientific organization, bringing together students and workers in all departments and from all parts of the country, and it still remains the only one. It has grown and broadened with time, as might be expected; it has been divided into a number of sections relating to different branches, and it has come to embrace Canada as well as the United States; so that it is not merely a national but a truly "American association." Twice it has met in cities of the Dominion, having been received with great respect and cordiality in both Montreal and Toronto (1882 and 1889).

When it was first organized, there were local scientific societies of high standing that had done excellent work for many years. Of these, the American Philosophical Society at Philadelphia antedates the Revolution, going back to 1769; next came the American Academy, at Boston, 1780; then the Philadelphia Academy of Natural Sciences, the Franklin Institute (Philadelphia), the Boston Society of Natural History, the American Antiquarian Society, Worcester, Mass.; the Lyceum of Natural History of New York (now the New York Academy of Sciences), and others. These had been publishing reports and proceedings, and around them were gathered a large number of able and eminent workers in science. Yale College had become a center of scientific interest, under such men as Silliman, Shepard, and Olmsted; and the American Journal of Science, long spoken of as "Silliman's Journal," was already a medium of general communication among students of Nature. Scientific surveys had been begun in several States, and the great geological and natural history survey of New York was engaging such leaders as Hall, Emmons, Mather, Vanuxem, and De Kay; while the

celebrated United States Exploring Expedition under Captain Wilkes, with young Dana as its naturalist, had extended interest into the study of regions hitherto almost unknown or inaccessible.

But some organization for personal intercourse and contact between the workers in varied fields and at widely separated points was becoming plainly necessary. The societies and colleges and surveys were doing good work and gathering about them able men; but they were local and disconnected in their scope, and could accomplish far less for the development of American science than would be possible if a definite system of communication could be established among them all. Such a work was that of the association; the early founders saw the need, and planned well and wisely to meet it; and for fifty years the organization has held on its way and fulfilled its work in excellent measure. But it has had its vicissitudes and its modifications; and it may be well to refer to some of these, and to consider certain aspects in relation to its future usefulness and power.

At the first meeting there were recorded four hundred and sixty-one members, sixty-one being from Boston and vicinity, and fifty-six each from Philadelphia and New York; the number actually present is not on record. The original plan was to hold two meetings each year, one in a Northern city in the summer, and one in the South or West in the winter or spring; this plan was only carried out for two years, 1850 (Charleston and New Haven) and 1851 (Cincinnati and Albany). In 1854 the association met in Washington, with Prof. James D. Dana as its president, while the membership had risen steadily to a total at that time of one thousand and four. It then fell off to six hundred and five, but again rose year by year to nearly a thousand in 1858, when Baltimore was the place and Prof. Alexis Caswell the president. For two years it fell again, and then came the civil war. The place chosen for 1861 was Nashville, but the meeting was given up on account of the condition of the country, and the association did not convene again until 1866. After 1867, when the membership was but little over four hundred, it began again to increase by one or two hundred yearly, though irregularly, until it again passed the thousand mark in 1879 (Saratoga meeting, Prof. George F. Barker presiding), and then leaped to fifteen hundred and fifty-five at the great Boston meeting of 1880. From that time it has varied from sixteen hundred to two thousand and over, the meetings at Minneapolis, 1883, Washington, 1891, and Rochester, 1892, having recorded a total of 2,033, 2,054, and 2,037 respectively.

The attendance at the meetings has varied even more than the membership itself, very rarely reaching or surpassing one half or, in

recent years at least, falling below one fifth. From one third to one fourth may be taken as a general average. The causes for these fluctuations are not difficult to trace, although at first sight they are not very evident. The migratory character of the association is to a considerable extent the main reason. It has been the custom for many years to meet somewhat alternately in Eastern and Western cities; and the fact has been conspicuous that the Western meetings have usually been "off years" in attendance. At the same time, if the membership from accessions in the previous year, at a large meeting on the seaboard, has been high, the smaller attendance makes a marked reduction in proportion to the membership. Other circumstances have at times caused increase or diminution in attendance in special ways. Thus the Springfield (Massachusetts) meeting of 1895 was held so late in August that many teachers could not attend it and be at home in time for the opening of their work at the beginning of September, and this palpable error was probably responsible for an unusually small attendance at a pleasant and convenient place. The Detroit meeting of 1897 was overshadowed by the meeting of the British Association at Toronto in the following week, as some who could not attend both occasions chose the latter as the more remarkable. On the other hand, the great Philadelphia meeting of 1884 owed its unequaled attendance, both actual and proportional (twelve hundred and sixty-one out of a total of nineteen hundred and eighty-one), to the presence of a large number of British members who came from the meeting of their association, held the week previous in Montreal, just as some four hundred American members went last year to Toronto.

Whenever the place of meeting is a large city, and particularly if it be one containing important scientific institutions, like Washington, Philadelphia, or Boston, both the membership and the attendance are greatly increased by the addition of many "local" members. Some of these remain permanently, while others drop off in the course of a few years; but the result is a net increase, though subject to many fluctuations, as we have already noted.

One fact is apparent, and very gratifying, from a study of these figures in detail—to wit, that notwithstanding a certain impression to the contrary in some quarters, the association has, since the civil war, maintained a steady though varying growth in numbers, and (when several years are taken together) a fairly uniform proportion of attendance to membership. At the recent meeting, the register of those present showed a little over nine hundred, while the total membership must be considerably above two thousand, and doubtless larger than ever before.

There seems no foundation, therefore, for the idea expressed

by some, that the association is losing ground, or failing to meet the objects for which it was designed. At the same time it might, and doubtless should, attain larger growth and wider influence in its new half century, proportionately as well as actually, than it has, and some suggestions to that end will be presently referred to.

Several causes have operated to produce the impression, or the fear, that has been spoken of. We have said that, when founded, it was the only national body of its kind, and also that it is so still. But the developments of science during the last half century have altered the conditions of its existence and its work in some important respects. These marvelous advances have been strikingly presented in the September issue of the Atlantic Monthly, by Prof. W J McGee, under the title Fifty Years of American Science, in which a comprehensive survey is given of the progress of science in its various fields during this remarkable period, with the philosophic breadth that marks Professor McGee's work. He states the share and the function of the association very happily in the following words:

"Since American science was young, the course of research and conclusion has been guided by an association of science-builders, who have freely contributed their mental and moral riches to their younger and poorer fellows. This association has shaped the progress of American science, and its semicentennial anniversary is America's jubilee of Science."

As was said above, however, new phases have developed in the work of the association, some within it and some without, from this very growth of science. The increase of specialism has led not only to a division of the association into nine sections, in place of the two or three of its early years, but to the formation of several separate organizations of specialists, which have been looked upon as tending to weaken, or even disintegrate, the main body. The American Chemical Society, the American Mathematical Society, and the Geological Society of America may be cited as leading examples, while less directly in such possible rivalry stand the American Forestry Association, the American Folklore Society, and the Association of Economic Entomologists. For the most part, however, there is no cause for apprehension from these sources. Most of these societies hold their meetings at the same time and place with that of the association, or on the days immediately preceding, and thus contribute quite as much as they might detract in the matter of attendance and interest. Some of them also pursue the original plan of the association, and hold another meeting at a different season of the year; this is the case with the Geological Society, of which the col-

lege and university professors can best gather in the summer, while the field workers in the United States Geological Survey are apt to be far away at that time, and can better convene in the winter or spring. So far as this department is concerned, moreover, and probably in others also, the number of papers offered for reading and discussion is amply sufficient to fill the whole available time of both the Geological Society and Section E of the association; and there is room enough and work enough for all, without fear of conflict. The same is true of Section H and the Folklore Society, and of Section G and forestry; while the stimulus and the freedom of separate and special organizations tend strongly to the advantage of those branches of science, so long as there is co-operation with the general body of the association.

The question has some resemblance to that of State rights, or "home rule," and national unity, in American politics. Elements of advantage and of power there are, in local associations and local pride and local tradition, that are of the highest value, not only to the community that cherishes them, but to the entire nation, and which could not be developed under a centralized government, while they should never be carried to the danger of disintegration. So it is with the specialist societies: so long as they are willing and ready to co-operate with the broader work of the association, each can help the other in the interest of science as a whole.

Another change, of a different kind, has also taken place, and has perhaps weakened the association. Some years since there was organized the more advanced and select body known as the National Academy of Sciences, limited in number, confined altogether to men who had achieved important results, holding aloof from the more popular aspects of science, and standing at certain times in a somewhat advisory relation to the general Government. It had its prototype in the Institute of France, and admission into it is a distinguished honor. Here again was a natural outgrowth of the progress of science, for which the association had prepared the way, much as the college does for the university. But it is a matter for regret that, in many cases, the men who have reached the "inner circle" of the academy have thenceforth disappeared from the association, or at least from active interest in it. This is not a just course; the scientist has no right to withdraw himself from the needs and interests of the people, even under the plea of lofty devotion to science for its own sake. To any who are so disposed, whether consciously or unconsciously, the words of Professor McGee, above quoted, may be earnestly recalled, when he speaks of "science-builders, who have freely contributed their mental and moral riches to their younger and poorer fellows," and also the strong and wise expressions of

Governor Wolcott and Mayor Quincy, in regard to the obligations of scientific men to use their attainments and diffuse their results for the advantage of society. "Science," said the former, "would be less worthy of our regard if its benefits were confined to a single class; but it is open to all."

There are some, perhaps, who feel that the dignity of science is compromised by the popular diffusion of its facts and results. This idea has an ancient flavor, of mysteries and arcana belonging to a learned caste, and too high and sacred for the "*profanum vulgus.*" But it has no right, and should find no tolerance, in this day, and above all in this country of equal rights and free institutions. Even were it not, however, so unmodern and so un-American, it would be impossible now to carry out. The question is only between the diffusion of scientific information among the general public by men of character and attainment, or by shallow and sensational charlatans. Happily, the great majority of scientists recognize and accept their high responsibility and privilege in this regard. But there is a danger and a tendency, among some, to overlook it or to disregard it, and to such the truth should be plainly spoken, while to all it may safely be reiterated.

The American Association for the Advancement of Science embodies this very idea, of diffusing and familiarizing scientific studies and results, under wise direction, among the intelligent and interested portion of the public. It has accomplished this result as no other agency has or could, while its organization is such that it is absolutely guarded against any lowering of its tone. Any person interested sufficiently to subscribe to the very moderate fees is eligible to membership, while the entire direction and control rest with the "fellows," who are students and workers of assured standing in science. Thus organized, it affords the amplest opportunities to the humblest lover of science to learn and to rise, while its officers and directors are men of professional reputation, jealous for its dignity and its influence.

In its migratory character, also, facilities for this result are admirably secured. Not only do the meetings in different cities afford especially favorable opportunities to the members for studying the geological, botanical, and other natural features of many parts of the country, and for visiting collections, museums, and libraries which ordinarily they might never see, but every meeting of the association gives an immense stimulus to scientific interest among the residents of the place visited, and leaves a permanent impression on the community. Quiet local students and workers are called into prominence and "honored in their own country"; beginners in science are quickened and encouraged; and local societies find themselves

for the time in touch with the great national association. Nor is this aspect dependent upon a large attendance: indeed, the meetings in smaller cities and at less conspicuous and accessible points have had perhaps quite as important an influence on the country as the great gatherings that are regarded as most "successful." The association has a twofold work—for its own membership and for the public;—and it may be that while the large meetings yield more of enjoyment and advantage to the former, the small meetings have relatively more important influence on the latter.

Amid the overwhelming attentions and courtesies of the recent meeting in Boston, there were some who felt almost embarrassed by the sense of being so largely recipients rather than givers. The circumstances, however, gave this character to the meeting; Boston was able to do it, and proud to do it. Younger or smaller cities, with less wealth of institutions and resources—literary, scientific, and historical—could not do the like. There the conditions would be reversed, and the association would be the giver rather than the receiver. One marked circumstance may illustrate this aspect. It has been the custom of the association to give one or two public evening lectures, "complimentary to the citizens" of the place, on important or attractive scientific topics; these have been prominent features of popular interest during the week of the meeting. This year the only evening lecture was rather for the benefit of the members, an exposition of the elaborate system of parks and water works of the city, in which engineering, sanitation, and æsthetic taste have been united to a degree unequaled elsewhere in the country.

If we turn, in closing, to the future of the association, and present some suggestions as to its enlarged usefulness and success, this would be one of the most important lines of thought—the association as an educating force. Standing as it does between both the local societies and the specialist societies, limited as these are by neighborhood and by subjects respectively, and the more advanced and select National Academy, the association may be likened in position to the college, standing between the schools and academies and the advanced work of the universities and professional institutions. It is the only body, in its very nature and scope, that can bring genuine science before and among the people at large. The "advancement of science" has two aspects—the increase of numbers, of intercourse, and of quality, among scientific students and workers, and the diffusion of sound and accurate scientific information among the intelligent but nonprofessional public. Both these ideas were aimed at in the plan of the association; both of them have been largely realized in its history, but the latter has rather been subordinate to the former. In its new half century, the educational function should doubtless hold

a larger place; nor will this involve the least diminution, but rather an increase, in its other aspects of usefulness.

As to how this end may be attained, a few closing hints may be offered. Every meeting of the association should aim to leave a distinct impress on the community where it is held. In a general way, as we have said, this has been done; but it has been rather incidental than designed. Every community has its limited circle of science-lovers, with perhaps a local society, little known, however, and little recognized, amid the interests of business and politics; it has its library and museum, its colleges and high schools, often struggling, with limited facilities, to arouse or to maintain an interest in scientific culture. All such local agencies should receive a definite accession of strength from a visit of the association; this result should be distinctly held in view as one of the objects of the meeting, and the city or town should find itself not only stirred and quickened by the temporary assemblage of scientists and scholars, but permanently enriched and uplifted. The association might well have a special committee, composed of one or two representatives from each of its sections, whose function should be to ascertain in advance the status of local societies and institutions in the place of meeting, and provide for some enduring advantage to them, as a memorial of the gathering and a return for the courtesies and hospitalities of the community. What forms such action should take would depend altogether upon local conditions, and would vary greatly in consequence thereof; but such a policy could not fail of important advantages to the cities visited and conduce to the strength and prosperity of the association.

In the matter of lectures, too, the association can accomplish much. The custom referred to, of giving one or more such lectures by leading members of the body to the people of the city, should be carefully maintained at each meeting. The recent case of Boston was exceptional in its conditions, but ordinarily this should be one of the "strong points." The character of the lectures should be high, and yet popular in the best sense; not merely interesting or attractive, but instructive. There are many important departments of science bearing upon practical questions—of health, of social conditions, of public advantage—upon which either little is generally known or the partial knowledge derived from magazines, newspapers, and irresponsible lecturers is crude and unreliable. To furnish a clear, careful, and "up-to-date" presentation of some subjects of this kind, in a form at once interesting and accurate, should form a part of every meeting, and would be highly valued by the community. Such addresses would probably be widely published by the higher-class newspapers of the country, and would not only be useful to the

public, but would bring honor and respect to the association. We are not saying that this has never been done, but that it might be done more and better; and that a definite policy of so doing would be an element of strength to the body and of benefit to the people at large.

Another line of desirable influence would be in relation to local societies. The association from the outset sought and accomplished the great advantage of bringing together scattered and isolated workers in science throughout the land. This social and personal intercourse has been and still is one of the strongest and best elements in the annual gatherings. But the local societies throughout the country are still in much the same isolation as the individual workers were fifty years ago; and some system of communication and co-operation among them would be a strength and a stimulus to all. Why might not the association bring about some method of intercourse or federation among these bodies, that would prove of great interest and value? The several scientific societies of Washington and of New York city (Manhattan) have for some years united in a "Scientific Alliance," or federation, and thereby, while preserving their separate identity, gained the strength that lies in union. Brooklyn has gone further, and merged into its one great "Institute" a number of distinct societies, as departments. These are merely cited as illustrations. But if the association should again have a committee representing its various sections, to consider some plan for co-operation and intercourse among the societies that now know so little of each other's work, the result might have great influence both on them and on itself. A local society in a small place often does excellent work; but it is wholly unknown beyond its own limited sphere. If it were provided, also, in the association that societies as well as individuals could become members, to be represented by one or more of their own members, as delegates, such representatives would come to the meeting, enjoy the interest and receive the stimulus of the occasion, and carry back to their own little circle reports of what they had seen and heard. These suggestions might be greatly amplified were there space to do so, but they can only be outlined here, as indicating ways in which the association might quicken the interest and unify the labors of the scattered scientific bodies of the country, and in turn receive support and advantage from them.

Various other lines of thought present themselves, which it is impossible here to discuss, bearing upon the prospects and possibilities of this great scientific body, upon its duties and functions toward the public and the corresponding duties which the public, and especially the scientific public, owe to it. Its history has been fruitful

and honorable, its mission is noble and broad, its future is full of "promise and potency." But, to realize these aright, it is needful that the association shall clearly recognize its obligation as an educating agency and keep in touch with the public, and that the scientists of the country shall sustain it in its work and contribute to it their best endeavors.

SKETCH OF SIR RICHARD QUAIN.

BESIDES being an extraordinarily popular and successful practicing physician, Sir Richard Quain contributed materially by his researches to the advancement of medical science, served the public in many responsible and highly useful positions, and earned a world-wide recognition by his work on the "Rinderpest" Commission.

RICHARD QUAIN was born at Mallow, on the Blackwater, Ireland, October 30, 1816, and died in London, March 13, 1898. He came of a family which contributed several eminent men to public life—two of his cousins, Jones Quain and Richard Quain, having distinguished themselves in anatomy and surgery, and a third, John Richard Quain, as a lawyer and a judge in the Court of Queen's Bench. His mother also belonged to an honorable family, that of the Burkes of Mallow, and was a great-grandniece of Bishop Burnet, who conducted the services at the coronation of William and Mary. Young Quain is said to have been precocious in his childhood, to have become thoroughly grounded in English and the classics, and to have distinguished himself at the examinations. When fifteen years old he was apprenticed for five years to an apothecary in Limerick, and gained considerable experience and made sagacious observations even at that age; and he is said to have resolutely fought the cholera when it raged in Limerick. In 1837 he proceeded to London and entered University College, where his cousins Richard and Jones held professorial chairs; was graduated thence M. B., in 1840; gained the scholarship and gold medal, and took honors in surgery and midwifery. He was appointed at that time house surgeon, and one year later house physician, or "resident medical officer," at University College Hospital. This institution was, during the five years he held that position, much thronged with "casualty" patients, the work on the extension of the London and Northwestern Railway bringing a large accession of laboring population within its bailiwick. With the degree of M. D., in 1842, he received a gold medal and a certificate of special proficiency. The next year he was elected a fellow of University College. In 1846

he was elected assistant physician to the Hospital for Diseases of the Chest at Brompton; was for many years consulting physician to the Seamen's Hospital at Greenwich, and to the Royal Hospital for Consumptives at Ventnor. He became a member of the Royal College of Physicians in 1846, a fellow in 1851, and was at different times member of its council and censor, Lumleian lecturer, senior censor, Harveian orator, and vice-president. From 1864 till his death he was one of the most conspicuous members of the General Medical Council, having been appointed crown member seven times, serving as chairman of some of its most important committees, and having been president of the council since 1891. He was one of the founders of the Pathological Society, an early secretary of it, and a frequent exhibitor at its meetings. While exceptionally popular and successful as a practitioner in medicine, a favorite in society, and a recognized authority on tuberculosis and diseases of the heart, Quain, his biographer in Nature says, "was closely set on the public work associated with medicine. Medical education, medical research, medical relief at hospitals—these were the subjects at which he mainly worked, and with an energy and avidity which appeared to grow rather than wane as time passed, and he attained in his old age the highest positions in the profession. A senator of the University of London; chairman of the Brown Institution, with Burdon-Sanderson, Klein, Greenfield, Horsley, and their equally distinguished successors working as professors there; one of the most prominent fellows of the College of Physicians, which was passing through a critical period of its history; and, finally, president of the General Council of Medical Education and Registration, of which he had been for thirty years a member—Quain had his hands full; yet he never appeared to grudge his time to a friend in want of advice; and he was always keen and ready for the latest information in science."

Probably Quain's greatest service to knowledge and to the general welfare was rendered in connection with the investigations of the royal commission to inquire into the nature, causes, and methods of prevention of the cattle plague, to which he was appointed in 1865, in association with Lord Spencer (chairman), the present prime minister, then Lord Cranbourne, Lord Sherbrooke, Dr. Lyon Playfair, Dr. Edmund Parkes, and Dr. Henry Bence Jones. "In the valuable transactions of this royal commission," the Lancet says, "Quain took a very prominent and useful part; in fact, for several months the question occupied almost his whole time. The whole matter was gone into most extensively by the commission, and not the least searching among the frequent questions were those addressed by Dr. Quain to the various veterinary and

medical witnesses. He throughout this inquiry showed himself an excellent and logical cross-examiner. Among the medical witnesses called were Dr. Burdon-Sanderson, who made an exhaustive report describing his experiments; Dr. Marcet, Dr. John Syer Bristowe, and Dr. Lionel Beale, who conducted the microscopical part of the inquiry. It is not surprising that after hearing the evidence adduced during the long sitting of this commission Dr. Quain should have sided with the section which desired the extermination of the plague 'at any price.' This was the view of the majority, but throughout the country there was an opinion, founded on insufficient data, that too high a price might be paid even for the stamping out of this fearful disease. This section of public opinion found its spokesmen on the commission in the persons of Earl Spencer, Lord Cranbourne (Salisbury), Mr. Clare Sewell Read, and Dr. Bence Jones. The majority included Mr. Lowe (Lord Sherbrooke), Dr. Lyon Playfair, Dr. Richard Quain, and Dr. Edmund Parkes. Dr. Quain's work on this commission very thoroughly justified his appointment, and his letters to the Times and articles in the Saturday Review went far indeed to change public opinion on the whole matter. The voice of the public at large was at first very strongly raised against the stamping-out recommendations of this commission. These recommendations, as Dr. Quain ably pointed out, would ultimately save many millions of pounds to the country, and the event has proved the correctness of his views. In the conduct of the Royal Commission of Inquiry perhaps the most essential detail is the arrangement of the method and scheme of the investigation. For this portion of the work of this most successful inquiry Richard Quain was in great measure responsible. In the third report of this commission there were a number of valuable drawings illustrating the pathology of the disease, and these were, at the instance of Quain, presented to the Royal College of Physicians of London."

Quain's first important essay in medical science, and the one on which the foundation of his reputation was laid, was his essay—"brilliant research," Nature calls it—on Fatty Degeneration of the Heart, which was contributed to the Transactions of the Royal Medical and Chirurgical Society for 1850, and appeared afterward in an expanded and exhaustive article in his Dictionary of Medicine. "Simple as the doctrine appears to us at the present day," says Nature, "fifty years ago it was a startling pronouncement by a young man fresh from his medical studies that fat may be and often is a product of the decomposition of muscular tissue, and that this change goes on in the living body. The ideas of life, nutrition, and death were greatly influenced by the doctrine. This, let us remember, was many years before Bauer and Voit, working with phosphorus

in starving animals, furnished the proof experimentally and qualitatively; and Quain's claim was freely admitted by Virchow and Paget." Previous to this he had published, early in his career at University College Hospital (1845), contributions on Bright's Disease of the Kidneys, and on Injuries to the Valves of the Heart. His Lumleian lecture before the Royal College of Surgeons in 1872 dealt with Diseases of the Muscular Walls of the Heart.

The Dictionary of Medicine, on which Dr. Quain's leisure time had been spent for several years since 1875, appeared in 1882, and met a real want, for Copeland's Dictionary had gone out of date, and Reynolds's System was not intended to be an encyclopedic book of reference. The Dictionary first appeared as a volume of nineteen hundred pages, and was the joint work of a very large number of prominent medical writers, among whom Dr. Quain himself and his editorial coadjutors, Dr. Frederick Roberts and Dr. Mitchell Bruce, contributed largely. The work, according to the Lancet, "admirably filled the want long felt by the medical profession of a thoroughly convenient and at the same time exhaustive book of reference. It had the additional advantage of being thoroughly brought up to the knowledge of the day, for, as its editor remarked in the preface, although it occupied some years in production, each part of it was so arranged as to permit of alteration and addition up to the very time of going to press. The editor's own articles chiefly dealt with affections of the heart." The Lancet points out that Sir Richard Quain's faculty for the arrangement of facts in such an order as to convey them to the mind of the reader in a succession which makes the whole train of reasoning symmetrical is particularly noticeable in the essay on Fatty Degeneration of the Heart, already mentioned, and is also traceable to but little less an extent in the articles on Angina Pectoris, Aneurism of the Heart, and Diseases of the Bronchial Tubes, and in the general remarks on Disease.

In 1885 Dr. Quain delivered the Harveian Oration at the Royal College of Physicians, taking for his subject The Healing Art in its Historic and Prophetic Aspects, and beginning his address with citations of the adverse remarks that had been made as to the progress of medicine by Hoffmann, Gregory, Sir William Hamilton, and others. In refutation of these statements he mentioned many curious and amusing instances of extraordinary superstitions concerning medicine and surgery from which mankind had freed itself. As a speaker he was not eloquent, and it is admitted that there was even a lack of breadth and dignity in his presentation of a subject; yet the Lancet commends the addresses he made at the meetings of the Medical Council as showing his familiarity with the details and the clearness of his memory on all subjects, and as presenting prac-

tical and statesmanlike views which were generally sustained by the after history of the affairs to which they pertained. Besides the Dictionary of Medicine, Dr. Quain, with a number of eminent co-laborers, prepared an Elements of Anatomy, which has passed through many editions, and has a high rank in the literature of the profession.

Dr. Quain received an honorary degree of M. D. from the Royal University of Ireland in 1887, and was made a fellow of the Royal College of Physicians of Ireland in the same year; was made a Doctor of Laws of the University of Edinburgh in 1889; in the same year was appointed Physician Extraordinary to her Majesty the Queen; was made a Doctor of Medicine of the University of Dublin in 1890; was elected a fellow of the Royal Society in 1871; was a fellow and late president of the Royal Medical and Chirurgical Society; a fellow of the Royal Botanical Society; a member and late president of the Pathological Society of London, to the Transactions of which he made several valuable contributions; was a member and late president of the Harveian Society of London; and a member of the senate of the University of London. On New Year's day, 1891, he was made a baronet of the United Kingdom.

His medical practice was largely in the higher circles of London society, and he enjoyed the personal friendship of many of the leading men of his time, among whom Carlyle, John Delane, proprietor of the Times, Landseer, and Robert Lowe are named.

Sir Richard Quain had been ill for more than a year previous to his death, and for the last six months confined to his bed. His last appearance in public was at the reading of his paper on the Cause of the First Sound of the Heart, before the Royal Society, in June, 1897, when the president made a special reference to the courage he displayed. The paper had been written in bed, and he had left his bed to present and defend it.

"His life," says Nature, "had been one of ceaseless activity, good health, and overflowing spirits; and when overtaken by disease he appeared not to regard or understand rest, physician though he was." The Lancet says: "To few men in our profession has the gift of every characteristic that calls forth the affectionate esteem of their brethren been so liberally vouchsafed as to Sir Richard Quain. His genial presence and his brilliant power of saying epigrammatic things, and saying them with the true humorous instinct of his race, made him ever popular; while his wide sympathies and unvarying kindness gave him in the eyes of those who had the privilege of personal relations with him something more true and permanent than social popularity, the affection of his younger brethren in the profession of medicine."

Editor's Table.

THE CONFLICT OF MODERN SOCIETY.

CIVILIZATION, whether considered as a result or as a process, may be defined as the improvement of individual lives through social intercourse. It is obvious that the isolated individual can not elevate or develop himself. Growth through society is the law of human nature; and the founder of Positivism had some very plausible reasons for speaking of humanity in the widest acceptation of the term as the "Grand Être." The individual realizes his powers in part through family life, further through national life, and still further through participation in the whole life, past and present, of the human race.

At the same time civilization, as we all know, does not go on continuously. Nations in the past have had their rise, their development, and their decay. They have had their rise when circumstances have compelled special social aggregations; their development during the period when, on the whole, individual characters were improving under social action; and their decay when the latter process has been reversed—when, upon the whole, men and women are receiving more harm than good from their social environment and their general intercourse with one another. Various reasons have been assigned for the decay of the older civilizations. An explanation which, so far as it goes, would apply to all cases is that men have not increased in virtue as they have increased in knowledge and power, and that they have consequently succumbed to temptations arising from the very successes they have achieved in social organization. If this theory is at all correct, a really stable civilization will only be founded when men have acquired the virtues necessary to enable them to use, as not abusing, the varied advantages accruing from their possession of advanced knowledge with its accompanying power over the resources of Nature.

This point of view seems to us, provisionally at least, a serviceable one; and we are therefore prompted to ask the question whether among the most favored nations of to-day public and private virtue is advancing as fast as material development, or whether there is any danger that modern civilization will, some generations hence, perish through the very abundance of the enjoyments and facilities of all kinds which it is furnishing, and will continue more and more to furnish, to the men and women of these latter times. In a word, are we able to stand up against the temptations that our industrial and scientific and artistic development is throwing in our way? If *we* are able, how will it be with our children and grandchildren?

It would be idle and ridiculous at this moment to predict evil of modern society; but it is not predicting evil to point out that, here and there, our moral forces, in the great Vanity Fair of the world as it is to-day, seem to be weakening. We think, for example, that few well-informed persons will deny that the conditions of business at the present time are anything but reassuring. The question which men who wish to be honest are asking themselves is whether business will much longer be possible at all except for the managers of huge capitals. There is much in the conditions of the industrial world,

particularly in relation to the treatment of the wage-earning class, which is abhorrent to humane employers; but these very men see no escape for themselves from practices and policies which in their hearts they utterly condemn, save in a complete abandonment of the field of business competition. If some of our leading men of business would speak out frankly all they know, they could a tale unfold which, if not as grewsome as that of the ghost in Hamlet, would be full of baleful significance. The late Mr. Gladstone, toward the end of a long life of most varied experiences, said in reply to the question of a friend that the most serious evil he saw in the world to-day was the prevailing lust of wealth. This was not said lightly, but, as we are told, with an accent of great concern. Socialism and militarism, the aged statesman thought, were both less threatening evils than the accursed thirst for gold. To-day we are breeding up a race of men hardened in advance for the conflict before them. What the practice of the market requires them to do, that they are prepared to do; and whoever else burdens himself with scruples when business is to be done, they will give way to no such weakness. That is not only their secret thought, but almost their open profession. We find in this readiness of the young to accept eagerly the worst that the world of business can teach them a very discouraging sign of the times.

And whence this fierce and deadly determination to amass wealth at all costs? Why, wealth to-day means so much: there are so many more ways than there used to be of displaying and enjoying it, and so much of social distinction attends the possession of it. A man who has no wealth cuts so small a figure in the world. He may be this or that, but who cares much for him if he has no money to spend? So the mammon-worshipers reason, according to the light, or the darkness, that is in them.

This is undoubtedly a weak spot in our civilization. In reply to the question, How is this generation standing up against the seductions of wealth? the answer must be plain and to the point—it is not standing up well at all. The sacrifice of truth and honor to the making of money is widespread, and men justify themselves by the law of self-protection.

It is not only in the sphere of commerce that the spirit which we have described is paramount. It is seen in the professions, even the highest; and money everywhere is becoming the norm and standard by which everything is judged. Its corrupting power in the region of art is one of the main motives of Count Tolstoi's recent book.

Among the striking results of modern scientific development none is more conspicuous than the enormous increase which has taken place in the facilities for travel and communication. The telegraph has established a universal exchange of news, and the columns of our daily papers are overloaded in the attempt to place it all under our eye. We are supposed to be all very "busy men" nowadays, though we do not work so long hours as our fathers and grandfathers; and consequently everything which is brought to our attention is comminuted, peptonized, and otherwise prepared with a view to the utmost economy of effort in consumption. No newspaper would be so barbarous as to give us a narration of any matter, however interesting, without cutting it up into nice little morsels, each with its own catching title. Literature is more and more taking on the forms suited not so much to busy as to idle people;

and college courses are planned less with a view to general culture than to enabling each individual to jump at once on the very thing he wants, or thinks he wants, for the purposes of a practical career.

What has the mental result of it all been? The part which science has played has been to greatly enlarge our means of obtaining knowledge. It rested with this generation to use these enlarged means for wise or for foolish purposes; and we fear it is not possible to read the more widely circulated of our daily papers without concluding that, to a very large extent, the gift of science in bringing us so marvelously into touch with all the ends of the earth, and in cheapening so extraordinarily the means of information, has resulted far otherwise than could have been wished. Our vast intellectual advantages have culminated in the advent and reign of the Yellow Journal, to spread whose malodorous froth over the surface of the land whole forests are tumbled annually into the pulp mill.

When we speak of intellectual advantages, our "magnificent public-school system" should not be forgotten. It probably is as magnificent as the people's taxes expended by the people's politicians can make it; but does it educate? That is a question about which our most prominent educators can never entirely agree. It seems to us to be just a case in which, if the people could rise to the level of their opportunity, they might reap an enormous advantage; but the people do not effectively demand the best education for their children, and they do not get it. They effectively demand not a training for life, not a true education for the mind, but an education for business. Even in our higher institutions of learning, calculations in relation to business largely predominate. And the result is that high authorities in the educational world write articles on "The Increasing Illiteracy of the American People," and experienced professors explain how it is that all the instruction they give to their pupils in English language and literature can not overcome their corrupt habits of speech. But this is not the worst; the worst is that to thousands and thousands what is called education is rather a spur to lawless desires than an aid in the government of life.

The problem of the Sphinx is therefore confronting us as it has confronted other races and periods: how to stand up against the sun of our own prosperity. When it has been a question of enduring the storm and the blast, humanity has never failed; but when the victory over hardship has been won, then another battle has begun, in which, from a national standpoint, the forces of integration and progress have too often suffered defeat. We are enduring the strain of that conflict now, and while it is impossible not to hope for victory, the signs are many that the victory—which must take the form of the establishment of a true moral equilibrium in modern society—will not be achieved without difficulty.

THE BOSTON MEETING OF THE AMERICAN ASSOCIATION.

THE meeting of the American Association for the Advancement of Science recently held in Boston was in many respects a notable one. Marking as it did the completion of the first half century of the life of the association, it afforded a suitable opportunity for taking stock of the progress of science in this country during the last fifty years and for estimating the influence of the association as a leading factor in such

progress. The attendance was unusually large, including, along with many distinguished names, members from nearly all parts of the United States and Canada. A good many papers were read possessing, as a rule, a high order of merit, while, fortunately, not a few of them were couched in language that could be readily understood by an intelligent listener, and thus gave added interest to the proceedings.

The association was welcomed by Governor Wolcott in behalf of the Commonwealth of Massachusetts, Mayor Quincy representing the city of Boston, and President Crafts, of the Massachusetts Institute of Technology, where the sessions were held. Though brief, the addresses were in each instance thoughtful and impressive and were heard with keen appreciation by the large audience present at the opening session. A marked feature of all of them was the emphasis with which the speakers dwelt upon the value of science as an agency in education, and the great services it had rendered and was yet to render to the community at large in the improvement of the material conditions of life and the elevation of the intellectual and moral tone of society.

The citizens of Boston, as is their wont, received the association with open arms, sparing nothing in the way of hospitality and good feeling to make the occasion an enjoyable and profitable one to the nine hundred members who were present at the meeting. Wherever the latter appeared, whether in street car, hotel, or at special reception, all were made to feel that they were the honored guests of the city, meeting with a courtesy and consideration that alone would have been a fair return for the trouble and expense their pilgrimage had cost them.

The opportunities provided for social intercourse and recreation were numerous and varied. One day it was a steamboat excursion down the harbor, which could not have been better timed, as it did much to mitigate the effects of the extreme heat which afflicted the city. Another day the entire association was taken to Salem, where, after being bounteously dined, the members were shown the many places of interest, historic and scientific, for which that old city is celebrated. As the guests of Harvard University a day was also given to a visit to Cambridge. Here, under the guidance of members of the faculty, the laboratories, museums, and other features of scientific and educational interest belonging to the university were thrown open for observation. Lunch and tea were served in the great Memorial Hall, and the occasion was fittingly closed with an able address by President Eliot, delivered in Sanders Theater in the evening. Receptions given by Governor Wolcott, Mrs. J. C. Phillips, Mrs. William B. Rogers, the trustees of the Museum of Fine Arts, and the officers of the Boston Public Library were another form of contribution to the enjoyment of the members which was much appreciated. These, with a dinner given by Mayor Quincy to the principal officers of the association and foreign guests, and numerous minor excursions to various points of interest in the neighborhood of Boston, represent but incompletely the hearty and abounding hospitality with which the association was entertained. The kindly and cordial attentions that were everywhere showered upon them could not fail of their effect on the spirits of the visitors. This was seen in their beaming countenances, the uniform jollity that prevailed in spite of the excessive heat, and the felicitations that were heard on every

hand at the phenomenal success of the meeting.

In view of this general satisfaction, not only at the manner in which they had been received and taken care of, but also at the amount and quality of the work done, it may appear a little ungracious to call attention to what seems to us an unfortunate omission in the management of the meeting; and we certainly should not allude to it were it not that, in our opinion, it betrays a growing tendency to abandon, or at least to dwarf, one of the principal objects of the organization.

What we refer to is the lack of provision on the part of the association for the popular evening lectures that were instituted by its founders as a part of its educational work, and that for a good many years formed one of the most attractive features of its meetings.

In the earlier days of the association, and always in the British Association to the present time, popular lectures on subjects of public interest have had a prominent place in the proceedings. Usually given in the evening, they need not interfere with the daily routine, and always, when provided for, they have drawn crowded and intelligent audiences from among the people of the neighborhood, arousing interest in scientific matters that came near being enthusiasm, and so contributing directly and effectually to the object we have specified.

What was done in furtherance of this purpose at the Boston meeting can hardly be said to have been the work of the association. There were, to be sure, two interesting lectures in Huntington Hall the same evening on the value of scientific applications in municipal public works, as illustrated by what had been done in Boston; but these were delivered for Boston, and by two citizens of Boston, the Hon. H. H. Sprague and the Hon. George G. Crocker, and should properly be placed to the credit of Boston, thus increasing rather than diminishing the indebtedness of the association. The same may be said of President Eliot's instructive address before the association at Cambridge, which was indeed a type of what these evening lectures should be, and, in our opinion, was one of the most valuable contributions, at least so far as the public is concerned, to the proceedings of the entire meeting; but it was a part of the entertainment offered by Boston.

The tendency of the association away from its important educative purpose is further indicated by the abolition of the general sessions at the opening of the daily proceedings. These often became occasions for exceedingly entertaining discussions of subjects of general scientific interest, in which the more prominent and experienced members were expected to and habitually did take part. Even the strongest advocates of more room for technical papers acknowledge that the work of the association has of late attracted less and less of popular attention. Whatever force may be given to the plea that many of its most eminent members have been drawn away to the American Academy of Sciences, the fact remains that the time was when, with not half its present membership, the meetings were of far greater public interest than they are to-day; and there was never any difficulty, when they were sought, in finding men abundantly equipped to interest and instruct an intelligent popular gathering. As scientific investigators multiply and research is extended, the number of technical papers presented to the association may be fairly expected to increase; but the number of topics the public will

want to hear about will increase with them, and if the technicalities are permitted to crowd out the more popular and edifying features, the educational influence of the association on the people at large can not fail to be seriously impaired, if it is not altogether destroyed.

Scientific Literature.

SPECIAL BOOKS.

MR. *Lester F. Ward*, in the book whose title is indicated below,* gives a very readable summary of his views upon sociological science. He still holds, as he tells us, to the theories enunciated in his Dynamic Sociology, published in 1882; but he does not seem to have obtained in the last sixteen years any additional light as to the form social evolution is likely to take under the influence of the psychic forces which he has described. There is to be a social evolution, so we are given to understand, determined by a social consciousness of social needs; but he is not able as yet to indicate any distinct dawning of such consciousness. He apologizes for the democratic governments which are to be organs of the expected progress. They will be all right some day, but up to date they are the "most stupid" of all governments. "They have to rely on brute force. They are short-sighted, and only know how to lock the door after the horse is stolen. They swarm and 'enthuse,' and then lapse into a state of torpor, losing all that was gained, and again surge in another direction, wasting their energies. In fact, they act precisely like animals devoid of intelligence." Lest the picture should be too dark, the author adds that "under exceptional circumstances they have displayed signs of collective intelligence." To their credit, however, be it said that democracies are "benevolent," while autocracies are always "rapacious." The democratic legislator knows what his constituents want and tries to get it for them. This is benevolent on his part, and the benevolence of the constituency, we suppose, will be shown in re-electing him. Dr. Pangloss himself could not have imagined a more beautiful illustration of the general perfection of the scheme of things.

The great trouble, however, is that so little mind beams through this benevolence. Mr. Ward acknowledges that this constitutes "the problem of sociology." He has wrestled with it, he says, for many years, and sees no way to increase the intellectual status of democratic governments save by improving that of the people at large. "If," he adds, "the social consciousness can be so far quickened as to awake to a full realization of this truth in such vivid manner as to induce general action in the direction of devising means for the universal equalization of intelligence, all other social problems will be put in the way of gradual but certain solution." It really seems to us as if in this sentence the stream of Mr. Ward's argument were losing itself, like an Australian river, in the sands of a highly Latinized, and all but unmeaning, verbiage. May we not, however, ask the question whether, with a marked increase in the general intelligence and

---

* Outlines of Sociology. By Lester F. Ward. New York: The Macmillan Company, 1898.

an accompanying improvement in the general morality of the community, there would not be a correspondingly reduced need for the kind of legislation directed to constructive social ends which the author so ardently invokes? The community is to be educated up to the highest point, in order that a highly intelligent legislature may do for the eminently intelligent and moral community what the latter in spite of its advanced education is still not quite intelligent or moral enough to do for itself. We find here a somewhat excessive complication. Besides, why, after all, should a serious writer like Mr. Ward worry about a "social consciousness" of which he can not pretend to assert that any organ exists? He knows perfectly well that consciousness is essentially an individual thing, and that the consciousness which we conceive as residing in one brain can by no possibility be the consciousness of another brain. A legislative committee may wield a delegated *power*, but such a thing as a delegated consciousness never yet existed and never will exist.

We are sorry to find Mr. Ward repeating a statement regarding Mr. Spencer, the incorrectness of which was fully demonstrated by Mr. Spencer himself in an article published in this magazine in the month of December, 1896, on the occasion of the first appearance in print, in the form of an article in the American Journal of Sociology, of one of the chapters of Mr. Ward's present book. The passage to which we refer is as follows: "Herbert Spencer, although he treated psychology as a distinct science, and placed it between biology and sociology in his system of Synthetic Philosophy, made no attempt to affiliate sociology upon psychology, while, on the contrary, he did exert himself to demonstrate that it has exceedingly close natural affinities with biology" (page 94). Mr. Spencer's reply to this was that he had, in the most distinct manner, indicated the dependence of sociology upon psychology, and that, in point of fact, the opening chapters of his Principles of Sociology dealt almost wholly with psychical factors. He adduced numerous passages from his writings proving that he had made his position upon this point perfectly plain. Any of our readers who care to turn to the number of this magazine which we have mentioned can see for themselves how complete was the refutation of Mr. Ward's erroneous statement. It seems to us that, as a matter of courtesy as well as of elementary justice, Mr. Ward should have seen to it that he did not put forth a second time an utterance so ill-founded and injurious. Mr. Ward himself, in the very paragraph in which he makes the allegation complained of by Mr. Spencer, furnishes evidence of its incorrectness. He says that at the close of the third chapter of Mr. Spencer's Psychology the fact comes clearly forth that "the class of attributes in the individual animal with which those of society could best be compared were its psychic attributes." Surely if this was clearly the drift of Mr. Spencer's argument there was no great need of repeated affirmations that a nexus existed between psychology and sociology. Mr. Ward is an industrious writer, and his style is, as a rule, clear and interesting. He seems, however, to take himself a little too seriously. When, in recapitulating (page 164) the conclusions which *he* claims to have reached, he includes the doctrine that "social forces are psychic," he can not fail to bring a smile to the face of any one who has ever read Spencer. The same effect is produced when he says (page 111) that he is the only one, so far as he is aware, "who has attempted to show a way out of the difficulty" connected with

the evolution of the human intellect. The book as a whole, however, is highly readable, and, with the reserves we have indicated, may be commended to those who are interested in the study of sociological questions.

The *Text-Book of Zoölogy** of Messrs. *T. Jeffery Parker* and *William A. Haswell* was prepared under peculiar, we might well say unique, conditions. Both authors are professors of biology at the antipodes, Professor Parker in the University of Otago, New Zealand, and Professor Haswell in the University of Sydney, New South Wales. They have collaborated while being most of the time twelve hundred miles apart by sea, and the manuscripts, proofs, and drawings of the book have had to traverse half of the circumference of the globe, or to London, in their journeys between the authors on the one hand, and the publishers, printers, artists, and engravers on the other. Though large and comprehensive, the book has been prepared with strict reference to the needs of the beginner, the mode of treatment being such "that no previous knowledge of zoölogy is assumed, and students of the first and second years should have no more difficulty in following the accounts of the various groups than is incidental to the first study of a complex and unfamiliar subject." Laboratory and museum study is contemplated, and the practice of preceding the study of a given group as a whole by the accurate examination of a suitable member of it is commended. Yet this method of types has its own dangers. "Students are in their way great generalizers, and, unless carefully looked after, are quite sure to take the type for the class, and to consider all arthropods but crayfishes and cockroaches, and all molluscs but mussels and snails, as non-typical." Hence a zoölogy that confines itself largely to types as examples "is certain to be a singularly narrow and barren affair, and to leave the student with the vaguest and most erroneous ideas of the animal kingdom as a whole." The authors, believing that every group which can not be readily and intelligibly described in terms of some other group should be represented in an elementary course of zoölogy by an example, have in the majority of cases described in some detail an example; and in cases where the diversity of organization is very great, two or more examples of every important class. By the time the example has been studied a definition of the class and of its orders will be intelligible, and will serve to show which of the characters already met with are of distinctive importance, and which special to the example itself. To make this part of the teaching more clear, a paragraph giving in more or less of detail the systematic positions of the example, is introduced after the classification. Following the table of classification with its brief definitions, the general account of the group is given, space being allotted to each group, so far as practicable, proportioned to its complexity and range of variation. Following out the plan of deferring the discussion of general principles till the facts with which they are connected have been brought forward, the sections on Distribution, the Philosophy of Zoölogy, and the History of Zoölogy have been placed at the end of the book. But, other considerations being thought more important in those cases, the general account of the structure and physiology of animals has been inserted immediately after the introduction, and the section on Craniate Vertebrata before the

* A Text-Book of Zoölogy. By T. Jeffery Parker and William A. Haswell. New York: The Macmillan Company. Pp. 779 and 683. Price, $9.

descriptions of the classes of that division. The chapter on the Philosophy of Zoölogy includes an exposition of the system of evolution, and that on the history a running account of what each student and author has contributed to the subject. A Guide to Modern Zoölogical Literature is given as an appendix.

GENERAL NOTICES.

THE object of Professor *Shaler's Outlines of the Earth's History* * is to provide the beginner in the study of the subject with a general account of those actions which can be readily comprehended and which will afford him clear understandings as to the nature of the processes that have made this and the other planetary bodies. Those series of facts have been selected that serve to show the continuous operation of energy. The author believes that the progress of science has been much retarded by the prejudices that have grown out of the idea that the existing condition of the earth is the finished product of forces no longer in action—the "static conception of the earth," as he calls it. A special attempt is made to guard the student against such misconception by presenting clear ideas of successions of events that are caused by forces operating in and on the sphere, of which what relates to the work done by the heat of the sun is the most interesting. The influence upon the history of the earth of the fate of man is also made prominent, and the author has sought to show the way in which geological processes and results are related to ourselves. Lastly, writing for the beginner, Mr. Shaler has avoided going beyond his depth. It is greatly to the advantage of the book that the author commands an easy, flowing style that is an attraction in itself. The first chapter opens as An Introduction to the Study of Nature, which the author insists, in the second chapter—Ways and Means of Studying Nature—should be begun outdoors with familiar objects. Next an account is given of the realm of the stars, and this is followed by a general description of the earth. The chapter on the Atmosphere includes so much more than is indicated by the bare title as to embrace all the work by the air, rain, rivers, lakes, the sea, and the geological work of water. The chapter on Glaciers is also correspondingly comprehensive, and could not be passed by without a notice of the Glacial period and the causes of the peculiar phenomena it afforded. In a similar vein are considered The Work of Underground Water, The Soil, and The Rocks and their Order. Here the length of the story already told compelled the author to stop, without presenting the accounts he had contemplated of the geological ages and the succession of organic life. The book is a full one as to all the subjects it covers.

As in the volume on Aristotle of The Great Educators Series Mr. *Thomas Davidson* tried to give an account of ancient classical and social education, so in the present volume * on *Rousseau* he has endeavored to set forth the nature of modern, romantic, and unsocial education. This education originated with Rousseau. The proper consideration of it involves the necessity of taking Rousseau's life into the review, and this is dwelt upon at considerable length, with the end of showing that his educational structure "rests, not upon any broad and firm foundation of well-generalized and well-sifted experience, but upon the private tastes of an exceptionally capricious and self-conceited nature." Hence Mr. Davidson is moved to say that if his estimate of Rousseau's value as an educator proves disappointing to those who believe in his doctrines, he is more disappointed than they are. In estimating the measure of Rousseau's influence, the author finds that upon religion it was incalculable, "supplementing, and in some ways counteracting, that of Voltaire"; in art and literature, it has been "almost paramount throughout Christendom," and, on the whole, beneficial; in the sphere of economics, "though entirely averse to socialism and anarchism, he was in a large degree the parent of both"; in politics he was the father of democracy;

* Outlines of the Earth's History. A Popular Study in Physiography. By Nathanial Southgate Shaler. New York: D. Appleton and Company. Pp. 417. Price, $1.75.

* Rousseau and Education according to Nature. By Thomas Davidson. New York: Charles Scribner's Sons. Pp. 253. Price, $1.

and in education his influence has "been powerful beyond measure." He may fairly be called the father of modern pedagogy, despite the fact that most of his positive teachings have been rejected. This has been brought about by the stimulus he gave to thought and to the revision of the old theories and methods, to which extent "his work was invaluable."

A comprehensive and instructive book, and, withal, curious and various, is Prof. *Alfred C. Haddon's The Study of Man*,* which forms one of the volumes of G. P. Putnam's Sons' "Science Series." The author, though accomplished in the science, does not offer the work as a treatise on anthropology or its methods, but merely as a collection of samples of the way in which parts of the subject are studied. The book is not intended for students or for scientific experts, but for the amateur and the "intelligent reader." The author's wish has been not merely to interest his readers but to induce them to become workers. Accordingly, being so completely versed in the subject that he is able to do so without abating one jot of scientific accuracy, he divests his style of conventional formalities and, becoming a friendly guide, makes various excursions into the subject, "not with the object of attempting to learn something about anthropology, not for the erection of an academic study, but for the simple purpose of explaining ourselves to ourselves. Our immediate object, then, is to try and discover what the immediate significance is of certain of our bodily peculiarities, and of a few of the innumerable objects and actions that we see around us." The theory of evolution throws a bright and far-reaching light on the problems of anthropology; and though we may not be able to explain the processes of or the reasons for evolution, there can be no doubt as to the fact of its occurrence. The vast importance of the study of children is recognized. From the nursery we are taken by the author to the school and the playground, endeavoring to discover in them evidence as to the direction of man's upward progress. Then reference is made to primitive survivals in child life, showing the persistence of savage psychological habit in children, and of savage and barbaric practice in their singing games. Other vestiges of the evolutionary progress are found in the backward people among ourselves. These features, after the discussion of the general subject and of the facts given by physical measurements, mark the general outline of the author's treatment. As special features and illustrations, we have chapters, highly suggestive, on the evolution of the cart, the Irish jaunting-car, toys and games, cat's cradle and kites, tops and the tug-of-war, the bull-roarer, the singing games of children, courting, funeral, and other games, showing how these severally embody in themselves the history of steps in man's advance from savagery up. The last chapter embodies practical suggestions for conducting ethnological investigations in the British Islands.

For several years much interest has been taken in American schools by British and Canadian educationists. Ontario has repeatedly found it profitable during the past twenty-five years to take notice of the school work done in many of the neighboring States; and our educational men have frequently been invited to address conventions of teachers in the province. In furtherance of the acquaintance thus sought, the author of this book* visited various places in New York for the purpose of gaining a knowledge of the schools of the State, and also studied the methods of some of the more important centers. Besides reporting what he saw of the work of the normal schools, high schools, manual training schools, and kindergartens, he has thought it well to combine with that object some description of the educational system under which they are conducted. The author thinks that no part of the republic presents a more valuable study to one interested in education than New York, and that no other part of the Union has made so much progress in education within the past dozen years. Yet the Canadians generally, and some others, regard their system

* The Study of Man. By Prof. Alfred C. Haddon. New York: G. P. Putnam's Sons. London: Bliss, Sands & Co., pp. 410.

* The School System of the State of New York (as viewed by a Canadian), Prepared under the Authority of the Honorable the Minister of Education, as an Appendix to his Report. By John Millar, Deputy Minister of Education. Toronto: Warwick Brothers & Rutter. Pp. 394.

of education as, upon the whole, superior to the system which prevails in any one of the States. But the educational methods of both countries are closely associated with features of their political systems; and "neither the United States nor Canada can adopt, without radical changes of another kind, some of the admirable features of the educational system which exists on the opposite side of the international boundary line."

The office of education is, according to Dr. Harris,* "to bring the child most expeditiously into a correct understanding of his relation to the race and into a helpful activity within civilization. The school with its various courses furnishes only one factor in this process; the institutions of family, church, and state, art and religion, play and work, each help in the development. The study of this mental unfolding and the influence of each modifying force is one of the provinces of psychology and one of great value to the educator. But of more importance to him than any theory of growth or classification of faculties is the profounder task accomplished by this science "in showing the ability of the mind to grasp ultimate reality." The old and new psychologies are sharply distinguished in methods and results. The former, whether rational or empirical, proceeds by introspection, and finds an independent self-activity with three modes of knowing: that of *sense-perception*, which dwells upon things as realities; the *understanding*, which investigates relations; the *reason*, or insight, which apprehends absolute principles. The "new psychology," including physiological investigation and child study, exhibits the conditioning of man. As the old philosophies teach him what he is and should be, the new explain how he may grow to his full stature. There is also the dangerous possibility of arrested development, which further experiment may show him how to avoid. Too much memorizing or calculating at an early age brings the child into a rut of thought from which it is not easily extricated. Even scientific study may accomplish this by sharpening the mind to notice mere likeness or difference, and to search for causal relations. The new psychology has this field of research, and can also instruct in regard to the care of the nervous system, and give us a store of pathological knowledge, but Dr. Harris considers it "safe to assert that no positive results in pure psychology will ever be reached in its laboratories." It is by means of introspection alone that we arrive at the highest stage of thinking, *θεωρεῖν*, philosophic or theologic knowing. The old psychology thus attains the ideas of God, freedom, and immortality, "knows that the absolute is a person," and furnishes ideals of education, religion, and life. Unfortunately for the majority of scientific people, they flounder in the quagmire of the understanding and never reach the height of "angelic knowing." Isaac Newton is called the great schoolmaster in this secondary stage of thinking, which is exemplified in later times by the doctrine of the correlation of forces. Mr. Herbert Spencer, following the lead of Mansell and Sir William Hamilton, is dragged down by his theory of the relativity of knowledge and inconceivability of the infinite into an abyss of false psychology. Dr. Harris states that the trouble is "the confusion of mental images with logical thought." Agnostics, relativists, and all others must agree with him, "if we really can know the infinity of space and time and the absoluteness implied in causality, it is a matter of great concern." In his doctrine of persistent force, Mr. Spencer attains almost to the stage of insight, "it is the highest reach of the understanding, and a logical investigation would prove that Personal Being is presupposed as its true form. It is another phase of the negative unity of Spinoza and the Eleatics, and to fully realize it is to know its own futility." Among other conclusions which are doubtless reached through the higher knowing are the affirmations that man has "two selves," "is a spiritual being existing *in opposition to Nature*," "fate rules in Nature, but man emerges out of Nature in time and space into human nature," "human society is founded on the deep mystery of vicarious atonement which is announced in the creeds of Christendom." If these and similar dogmas prove difficult for the scientific mind to assimilate, it is not without warning from Dr. Harris. He tells us that methods of science study have not a

* Psychologic Foundations of Education. By W. T. Harris, A. M., LL. D. New York: D. Appleton and Company. Pp. 400. Price, $1.50.

spiritualizing tendency, and that the analytic stage of mind holds itself back determinedly from thinking the totality. In more metaphysical language, we are content with the category of *otherness*. In somewhat fatalistic fashion he predicts for us: "Renounce teleology and you find nothing but teleology in everything. Renounce introspection, and you are to find introspection the fundamental moving principle of all Nature." It is, however, just to say that the book is a strong, consistent exposition of the *a priori* philosophy and its applications, and has the saving grace of compelling its opponents to examine the ground whereon they stand.

The author of the *Story of Photography** has high hopes for the future of photography and its capacity for continued development and production, and writes with the enthusiasm which they inspire within him. He specially seeks to present the subject in the light of a fine art and as a source of æsthetic and refined enjoyment—"not so much with the object of producing a manual to teach photography as an art, but, while giving due weight to that side of the subject, to present it in its most scientific aspects." The order of arrangement of the topics is largely historical. In the detail of "the first steps toward photography," the earliest hints perceived by experimenters of the power of the sun to produce pictures are recorded. Then the steps are followed by which the art became real, and its development, with accounts of modern processes and inventions—printing presses, color photography, the Telegraph and Photography, and Photography and Art, of which the author says in conclusion that the one who takes up the combined science and art with the motto "All that there is in it or nothing," "will find but little cause to complain of the limitations, in view of the almost boundless possibilities of photography."

In *La Culture des Mers en Europe*† (The Cultivation of the Seas in Europe), by *Georges Roché*, inspector general of maritime fisheries, the several branches of the propagation of fishes and oysters and the development of fisheries are treated, under the heads of piscifacture, or propagation, pisciculture, and ostreiculture. While not assuming to write a work on aquiculture, as he calls it, the author endeavors to instruct his readers concerning the working of maritime industries and the technics of the methods of fish and oyster culture. He first explains the modern methods of fishing and their results as applied to the European seas; then the methods of propagation and cultivation practiced in different countries and experiments in the reproduction of lobsters and crabs; the development of oyster culture in France since the natural supply became insufficient; and, in the last chapter, the cultivation of sponges.

The third volume of the *Illustrated Flora of the Northern United States, Canada, and the British Possessions** completes a work of the very highest value to American students. The number of species figured in the whole work is 4,162, comprising 177 families and 1,103 genera. Eighty-one of these species, being new determinations or new discoveries made while the book was going through the press, and too late for insertion in their proper places, are figured in the appendix. A conservative course has been pursued as to the admission of new species, and only those are inserted that have passed the test of continuous observation. It has nevertheless been thought better to err in the direction of illustrating too many forms rather than in giving too few. A general key of the orders and families is placed at the beginning of the volume, preceded by a table of abbreviations of the names of the botanical authors cited. A glossary of the botanical terms used is added. The orders are not described in the work itself, but their principal distinguishing characters are given in the key. The authors are sturdy advocates of the

* The Story of Photography. By Alfred T. Story. New York: D. Appleton and Company (Library of Useful Stories). Pp. 165. Price, 40 cents.

† La Culture des Mers en Europe. Piscifacture, Pisciculture, Ostreiculture. By Georges Roché. Paris: Félix Alcan.

* An Illustrated Flora of the United States, Canada, and the British Possessions; from Newfoundland to the Parallel of the Southern Boundary of Virginia, and from the Atlantic Ocean westward to the One Hundred and Second Meridian. By Nathaniel Lord Britton and the Hon. Addi on Brown. In three volumes. Vol. III, Apocynaceæ to Compositæ—Dogbane to Thistle. New York: Charles Scribner's Sons. Pp. 588. Price, $3 net.

recognition and the use, in ordinary talk and work, of the English names, and a list of all the popular names of plants belonging to our area, so far as they could be obtained, compiled by Judge Brown, is given in the general English index. A considerable number of the popular names occur in the text, in connection with the leading English names, or in the notes; and several thousand others, which could not appear in the text, are given in the index in Italics. The authors believe that no similar compilation of American plant names has ever been published.

The American Agriculturist Yearbook and Almanac for 1898 is the third number of that publication, the plan of which is to make each annual volume valuable of itself, and properly supplementary of its predecessors. It proposes to be a cyclopædia of events, a market guide, a treasury of statistics, and a reference work on subjects of timely interest. The present number contains, first, almanac matter, general notes, and agricultural miscellany; an article on Our own Country and Government, with notices of all the States and portraits of their governors; Our Neighbors North and South of Us (Canada, Mexico, and North and South America); The Great Problems of 1898 (a summary of the present condition of important questions and interests); For the Whole Family (in which a variety of useful or curious things are considered); The Agriculturist's Guide, Commercial Agriculture, Irrigation, Lumber and Forestry, and a number of miscellaneous paragraphs. (Orange Judd Company, New York. Price, 50 cents.)

Part XII, March 7, 1898, of *Minnesota Botanical Studies*, *Conway MacMillan*, State Botanist, embraces the title-page and tables of contents and the index of a series of original, most competent, and highly valuable and interesting studies of plant phenomena published as Bulletin No. 9 of the Geology and Natural History of the State, and forming a volume of 1081 pages.

Much interesting information is well packed in a small space in Prof. *Sydney J. Hickson's Story of Life in the Seas* (D. Appleton and Company's Library of Useful Stories; price, 40 cents). Without presuming to treat in full any of the aspects in which marine life may be regarded, the author's purpose has been only to give a sketch of some of the most important lines of scientific researches pursued by zoölogists in many parts of the world; to compress into small compass and describe in language intelligible to the laity discoveries of the deepest interest which are in many cases described in books and periodicals that do not come within reach of the general public. The first chapter relates the progress and describes the more prominent facts of oceanography. The succeeding chapters are given to accounts of shallow-water fauna, the shallow-water fauna of the tropics, invertebrate and vertebrate surface-swimming fauna, deep-sea fauna (in which many new and remarkable discoveries are recorded), commensalism and parasitism; and in the final chapter the origin of the marine fauna is considered and the reasons are mentioned for supposing that life originated in the sea.

Prof. *Dean C. Worcester*, of the University of Michigan, and *Frank A. Bourns* publish in the Proceedings of the United States National Museum lists of the birds that inhabit the Philippine and Palawan Islands, which show their distribution within the limits of the two groups.

The investigations and explorations connected with the Hopkins Seaside Laboratory, adjunct to the Biological Laboratory of Leland Stanford Junior University, have been carried on by means of assistance given by Mr. Timothy Hopkins, of Menlo Park, Cal. The tenth memoir of this series is a paper on *Scientific Names of Greek and Latin Derivation*, prepared by Prof. *Walter Miller*, and furnishing rules and hints to aid in giving such names an etymologically correct shaping. The memoirs are published as a part of the proceedings of the California Academy of Sciences.

The *Centralization of Administration in New York State* is a valuable political study contributed by *John Archibald Fairlie* to series of Studies in History, Economics, and Public Law of Columbia University. It shows how power, all centralized in the hands of the Governor in the early history of the country, was gradually taken away from him during the seventeenth and eighteenth centuries, when the towns gained a practical independence in local affairs, recognized under

English rule by the Duke of York's laws; the cities of New York and Albany received a large degree of autonomy; the creation of an elected county authority immediately followed the establishment of a legislature in 1691; and the powers of the legislature and the county supervisors were both increased at the expense of the central executive during the next one hundred years. This power seems to have reached its culmination in the Constitution of 1821, after which an isolated movement or two in the reverse direction may be perceived, the beginning of a tendency that became more evident about the middle of the century. Since then the return toward centralization has become more and more marked and rapid, and has now gained great force, the tendency toward State control and direct State administration being accompanied by a marked development of what may be called local centralization. Mr. Fairlie's paper is a careful study of the causes and influences that have contributed to this later movement.

The fifteenth volume of the *Transactions of the Kansas Academy of Science* contains the minutes of the twenty-eighth and twenty-ninth annual meetings, 1895, 1896, with eight of the papers read at the former meeting, and a considerably larger number of those read at the latter. In all, forty-two papers were read at the twenty-eighth annual meeting, and forty at the twenty-ninth. Measures have been taken by the academy for the publication of scientific monographs on the resources of the State.

The *Bibliography of the Metals of the Platinum Group* (platinum, palladium, iridium, rhodium, osmium, and ruthenium), 1748–1896, prepared by Prof. *J. Lewis Howe*, was recommended to the Smithsonian Institution for publication by the American Association's committee for indexing chemical literature. The compiler has tried to make the record of the chemistry of the metals in question as complete as possible, and it is believed that few references of importance are omitted.

PUBLICATIONS RECEIVED.

Agricultural Experiment Stations. Bulletins and Reports. Colorado State Agricultural College: No. 47. Colorado's Worst Insect Pests and their Remedies. By C. P. Gillette. Pp. 64, with plates.—Cornell University: No. 148. The Quince Curculio. By M. V. Slingerland. Pp. 24.—Delaware College: No. 40. Soil Bacteria in their Relation to Agriculture. Part I. By F. D. Chester. Pp. 16.—Michigan State Agricultural College: No. 159. A Study of Normal Temperatures and the Tuberculin Test. By C. E. Marshall. Pp. 52; No. 160. Some Insects of the Year 1897. By R. R. Pettit. Pp. 40; No. 161. Fertilizer Analyses. By R. C. Kedzie. Pp. 20.—Michigan Bureau of Vital Statistics: June and July, 1898. Pp. 20 each.—Ohio: No. 93. The Home Mixing of Fertilizers. By C. E. Thorne. Pp 20.—Purdue University: No. 70. The Relation of Water Supply to Animal Diseases. By A. W. Bilting. Pp. 12; No. 71. Corn Meal and Shorts and Skim Milk as Food (for Pigs and Young Growing Chickens). By E. S. Flume and W. B. Anderson Pp. 10; Commercial Fertilizers. Special Bulletin. By H. A. Huston. Pp. 8.—United States Department of Agriculture: Flax Culture for Seed and Fiber in Europe and America. By C. R. Dodge. Pp. 80.

Andrews, Charles M. The Historical Development of Modern Europe. From the Congress of Vienna to the Present Time. New York: G. P. Putnam's Sons. Pp. 467. $2.50.

Binet, Alfred; Ribot, Th.; and others, Editors. L'Année Psychologique (The Psychological Annual). Fourth year. Paris: Schleicher Frères. Pp. 849. 15 francs ($3).

Bulletins, Proceedings, Reports, etc. American Chemical Society: Journal, August, 1898. Pp. about 100. $5 a year.—Association of American Anatomists: Proceedings of the Tenth Annual Session, December, 1897. Pp. 142.—Iowa, State University of: Laboratories of Natural History. Three papers. Pp. 84, with plates.—New York State College of Forestry, Cornell University: Announcement, 1898–'99. Pp 40.—Ohio State University: College of Agriculture and Domestic Sciences, 1898–'99. Pp. 16.—United States Civil Service Commission: Fourteenth Annual Report, 1896–'97. Pp. 502.—University of Upsala, Sweden: Bulletin of the Geological Institution. Edited by Hj. Sjögren. Vol. III. Part II. Pp. 144.—Wisconsin Geological and Agricultural Survey: On the Forestry Conditions of Northern Wisconsin. By Filibert Roth. Pp. 84, with map.

Collins, G. S., Editor. Selections from Jean Paul Friedrich Richter, with Notes. American Book Company. Pp. 163. 60 cents.

Davis, H. M. The Rutherfurd Photographic Measures of Sixty-five Stars near 61 Cygni; Parallaxes of 61^1 and 62^2 Cygni; Thirty-four Stars near "Bradley 3077." Pp. 182. Women Astronomers, Pp. 32.

Goldman, Henry. The Arithmachinist. A Practical Self-instructor in Mechanical Arithmetic. Chicago: The Office Men's Record Company. Pp. 128. $1.

Hayford, J. F. A Text-Book of Geodetic Astronomy. New York: John Wiley & Sons. Pp. 351, with plates.

Hoffman, F. S. The Sphere of Science. A Study of the Nature and Method of Scientific Investigation. New York: G. P. Putnam's Sons. Pp. 168. $1.

Lyte, E. O. Elementary English. Pp. 160. 35 cents. Elements of Grammar and Composition. Pp. 224. 50 cents.

Peckham, G. W., and Elizabeth C. On the Instincts and Habits of the Solitary Wasps. Wisconsin Geological and Natural History Survey. Pp. 245, with plates.

Quinn, Rev. D. A. Stenotypy; or, Shorthand for the Typewriter. Providence, R. I.: American Book Exchange.

Reprints. Calvert, P. P.: The Adonate Genus Macrothemis and its Allies. (Boston Society of Natural History.) Pp. 32, with plates.—Herman, Nathan, M. D.: Hypnotism in General Practice. (Maryland Medical Journal.) Pp. 5.—Hyatt, Al-

pheus: Report as Curator of the Boston Society of Natural History. Pp. 26.—Minot, C. S.: On the Veins of the Wolffian Bodies in the Pig. (Boston Society of Natural History.) Pp. 12, with plates.—Storer, F. H.: Bussey Institution. Laboratory Notes and On the Systematic Destruction of Woodchucks. Pp. 16.—Wadsworth, M. E., Houghton, Mich.: The Mechanical Action of the Divining Rod. P. 1.

Sheerin, Robert, M. D., Editor. The Suggester and Thinker. Monthly. Vol. I, No. 1. July, 1898. Cleveland, Ohio. Suggester and Thinker Company. Pp. 30. 10 cents; $1 a year.

Smithsonian Miscellaneous Collections. No. 1076. A Catalogue of Scientific and Technical Periodicals. 1665 to 1895. Together with Chronological Tables and a Library Check List. By H. C. Bolton. Second edition. Pp. 1247.—An Investigation of the Influence of Impure Atmosphere on the Resistance of Animals to the Organisms of Disease. By D. H. Bergey, M. D. Pp. 10. —Contributions to Knowledge. Ratio of Specific Heats at Constant Pressure and Constant Volume for Air, Oxygen, Carbon Dioxide, and Hydrogen. By O. Lummer and E. Pringsheim. Pp. 29.

Udden, J. A. The Mechanical Composition of Wind Deposits. Augustana Library Publications. Rock Island, Ill. Pp. 69.

Vocke, William. The Relations of the People of the United States to the English and the Germans. Pp. 20.

Von Nägelli, Carl. A Mechanico-Physiological Theory of Organic Evolution. Summary. Chicago: The Open Court Publishing Company. (Religion of Science Library.) Pp. 53.

Wilson, Woodrow. The State. Elements of Historical and Practical Politics. Revised edition. Boston: D. C. Heath & Co. Pp. 656. $2.

Fragments of Science.

Growth of Astronomical Photography.—Reviewing the history of astronomical photography in his address as vice president before the Astronomical and Mathematical Section of the American Association, Prof. E. E. Barnard credited the inception of the idea to the Rev. Thomas Dick, author of a series of astronomical works formerly much read, who, shortly after Daguerre's discovery was announced, speculated upon the practicability of applying it to the moon; thought the planets would prove easy subjects to the new process, and that something might perhaps be discovered about the nebulæ; and suggested that objects not visible to the eye might be found depicted on the plates. While much excellent photographic work has been done on the nebulæ, the photography of the planets seems to-day no nearer realization than in Dr. Dick's time. In 1839, Arago addressed the French Academy on the subject of photographing the skies, and within a year from that time Dr. Draper, in New York, had succeeded in getting a picture of the moon. Five years later Harvard College began its photographic work, and pictures of the moon were secured with the fifteen-inch equatorial. Since then this work has made great advances, to which American investigators have contributed materially. The completion of the Lick Observatory marked a decided advance in study. In photographic work on the sun, detail on the surface was first sought; the prominences next became objects of examination, and the corona was then taken up. With the application of the dry plate, students have gone back to detail on the surface and within the sun spots. A most important branch of investigation is that of stellar photography, which dates from 1882, when the astonishing number of stars shown on Dr. Gill's photograph of a comet at the Cape of Good Hope attracted attention. The work has been taken up with energy by many observatories, and most excellent results have been accomplished.

Officers of the American Association.—The Council of the American Association for the Advancement of Science chose Prof. Edward Orton, State Geologist of Ohio, and President of Ohio State University, to be president of the association for 1899, and Columbus, Ohio, as the place of the meeting. The following other officers, and sectional vice-presidents and secretaries, were chosen: General Secretary, F. Bedell. Secretary of the Council, Charles Baskerville. Treasurer, R. S. Woodward. Vice-Presidents: Section A, Alexander MacFarlane; Section B, Elihu Thomson; Section C, F. P. Venable; Section D, Storm Bull; Section E, J. F. Whiteaves; Section F, Simon H. Gage; Section G, Charles R. Barnes; Section H, Thomas Wilson; Section I, Marcus Benjamin. Secretaries: Section A, John F. Hayford; Section B, William Hallock; Section C, H. A. Weber; Section D, James M. Porter; Section E, Arthur Hollick; Section

F, Frederick W. True; Section G, W. A. Hellerman; Section H, George A. Dorsey; Section I, Calvin M. Woodward.

New Elements.—Prof. Charles F. Brush, in a preliminary paper read to the American Association, described a new atmospheric gas which he discovered while examining glass for occluded hydrogen, and has found absorbed in many substances. It has been partially separated from air by diffusion. The chief characteristic of this gas thus far experimentally determined is enormous heat conductivity at low pressure. Even when mixed with a large excess of other gases, its heat conductivity is about a hundred times that of hydrogen, and this will probably be increased many times when it is obtained pure. Taking the heat conductivity at this figure—a very moderate estimate—the mean molecular velocity of the new gas is calculated to be more than a hundred miles a second, and its density only a thousandth part that of hydrogen, while the specific heat is found to be six thousand times greater than that of hydrogen. A gas having attributes anything like these could not possibly be confined to the earth's atmosphere; hence the new gas probably extends indefinitely into space, and constitutes an interstellar atmosphere. In recognition of this probability, Professor Brush has named it etherion. Professor Nasini, of Padua, and two associates report that in studying the gases emanating from the earth in various parts of Italy, with the object of detecting the presence of argon, helium, etc., they have discovered in the spectrum of the gases of the Solfatara di Pozzuoli, along with other lines deserving investigation, a fairly bright line corresponding with that of (solar) corona 1474 K, attributed to coronium, an element not previously discovered on the earth, and which should be lighter than hydrogen.

A Paradise for Wild Animals.—During the last four years, the London Spectator tells us, the Duke of Bedford has carried out a scheme of animal acclimatization in the park at Woburn Abbey never before attempted in England. "Birds as well as quadrupeds are the subjects of this experiment. . . . But the greater number of the animals are various kinds of deer, of which no fewer than thirty-one species are in the open park or paddocks, bisons, zebras, antelopes, wild sheep and goats, and yaks. The novelty and freshness of this experiment consist not only in the accumulation of such a number of species, interesting as this is to the naturalist, but in their way of life, free and unmolested in an English park. That is the lot of the greater number of the animals at Woburn, some being entirely free and roaming at large, like the native red deer and fallow deer, while the others, though for the present in separate inclosures, are kept in 'reserves' so spacious and so lightly though effectively separated that they have the appearance of enjoying the same degree of liberty." The general effect on the view of this gathering of animals from all quarters of the earth on the green pastures and under the elms and oaks round the home of a great English family is described as being magnificent. "During the journey back by train through Bedfordshire and Buckinghamshire, the valleys and meadows stocked with our ordinary domestic animals seem solitary and deserted after the eye has rested for hours on the varied and impressive forms that crowd the slopes, groves, and glades of this glorious park. This effect is due in part to the largeness of the scale on which the stocking of Woburn with wild animals has been carried out. In the phrase of the farmer, the park 'carries a larger head' of animals than is commonly seen on a similar area, even in the richest pastures. The scene recalls the descriptions of the early travelers in southern Africa, when the large fauna roamed there in unbroken numbers and with little fear of man. . . . From one position, looking up a long green slope toward the abbey, there could be seen at the time of the writer's last visit between two and three hundred animals, both birds and beasts, feeding or sleeping within sight of the immediate front of the spectators. These varied in species from cranes, storks, and almost every known species of swan, to wapiti stags, antelopes, and zebras, walking, sitting, galloping, feeding, or sleeping. For quite half a mile up the slope the white swan and other wild fowl were dotted among the deer and other ruminants, presenting a strange and most attractive example of the real 'paradise' which animals will make for

themselves when only the 'good beasts' are selected to lie together."

Play and Development.—In a paper on play as a factor in development, published in the American Physical Review for December, 1897, George A. Fitz, of Harvard University, places himself upon the theory now generally accepted by those who have given the most careful study of the subject, that play is simply the most important means Nature has of preparing her children for their life work. "We can readily see how this has come about. The animals which played were able to make a better fight for existence, hence survived, and fixed in their progeny the desire to play as an instinct. Play is not merely the result of the accidental desires of the individual; it is a result of that natural selection which demands everything serviceable to the preservation of the species. Thus youth becomes more completely an apprenticeship to life, with play as the master workman. All of Nature's children play and are thereby prepared to live; not playing, they die. Granting, then, that play is one of the most powerful instincts in animal life, let us study its more intimate relations to human life. How does the child who plays vigorously and spontaneously differ from the child who plays under close restriction or not at all? . . . He is born with an inherited tendency to grow into the adult form, but this inherited force toward development is not sufficiently strong to produce unassisted more than a mimicry of the best adult form, mental or physical. The great law of development is the law of use. No organ or tissue, no power of muscle or brain, can be fully developed except through use, through effort. In the play of young animals we find all the conditions of use necessary for their highest development. In the spontaneous play of the child with unrestricted opportunities, we find again the conditions of use for all the tissues fully satisfied." Further than this, the child is habituated to make rapid judgments in the presence of ever-changing relations; there is probably no factor so potent in the balance of the nervous system; in its psychic effects it gives a complete psycho-physiological picture of pleasure. "In play, the child is the unit of force; he initiates his own conditions. His limitations are self-imposed. His self-control lies in execution rather than inhibition. He is concerned with self-expression rather than with self-repression. Play thus relates itself to the truest conception of education, the development of power, the power of the individual to act as a self-directed unit in civilization. The self-control gained by play acts immediately, strongly, and honestly in response to conditions as they are presented in life."

The Place of Plant Physiology.—Plant physiology, as briefly defined by Prof. D. T. MacDougal, is concerned with the fundamental properties of the protoplasm of plants, and the functions of the organisms into which it is formed. It therefore includes the consideration of all reactions of growth, movement, metabolism, changes in form, instability, and other phenomena resulting from the activity of forces internal to the plant. It merges into morphology on one side, and partly underlies oölogy on the other, and with bacteriology and mycology forms the basis of the study of pathology. Physiology and chemistry join in the consideration of the chemical activities and products of the organism, and the principles of physics are involved in the investigation of the plant machine. It is too often slighted in schools by being made a text-book and routine study. "A systematic survey reveals the fact that, instead of a complete and thorough plotting of the great field of physiology, we have made here and there a few simple trails through the dense jungle of ungrouped and vaguely defined principles, and the greater part of the work is yet to be accomplished. The fundamental problem of the constitution of living matter still confronts us." We have not yet succeeded in interpreting clearly even the cruder visible phenomena of the cell. The interprotoplastic threads have so far received no conclusive interpretation. Numerous problems relating to nutrition wait for solution—the relations of chlorophyll, of the nitro-bacteria, the acquisition of nitrogen, the balance and combined action of the mineral elements in the soil, the formation and work of the alkaloids, glucosides, pigments, and other compounds in the plant, and the ascent of sap, are only a part of the subjects concerning which we are still in the

dark. It is becoming more and more evident that molecular features of growth, and the relation of this process to correlative forces and those of the environment, are hardly at all determined.

United States Railway Statistics.—Advance sheets of the Tenth Statistical Report of the Interstate Commerce Commission are authority for the following statistics: The total railway mileage in the United States on June 30, 1897, was 184,428.47 miles, there being an increase of 1,651.84 miles, or 0.90 per cent, during the year. The total number of locomotives in service on June 30, 1897, was 35,986, the increase in number as compared with the preceding year being 36. The gross earnings of the railways of the United States for the year ending June 30, 1897, as reported for an operated mileage of 183,284.25, were $1,122,089,773. In comparison with the preceding year this amount shows a decrease in gross earnings of $28,079,603. The number of men employed by the railways of the United States on June 30, 1897, as reported, was 823,476. A comparative summary is presented in the report of the average daily compensation of the different classes of employees for the years 1892 to 1897. Another summary is given in the report which shows the total amount of compensation reported as paid to railway employees during the fiscal years 1895 to 1897. It covers the compensation of over 99 per cent of railway employees for the several years. Regarding the year ending June 30, 1897, it appears that the aggregate amount of wages and salaries paid was $465,601,581. This amount represents 61.87 per cent of the total operating expenses of railways, or $2,540 per mile of line. The total compensation for 1896 was $3,222,950 greater. The total number of casualties to persons on account of railway accidents for the year ending June 30, 1897, was 43,168. Of these casualties 6,437 resulted in death, and 36,731 in injuries of varying character. Of railway employees, 1,693 were killed and 27,667 were injured during the year. The total number of passengers killed during the year under review was 222; injured, 2,795. Ninety-three passengers were killed and 1,011 injured in consequence of collisions and derailments. Other than employees and passengers the total number of persons killed was 4,522; injured, 6,269. Included in these figures are casualties to persons classed as trespassers, of whom 3,919 were killed and 4,732 were injured. From summaries showing the ratio of casualties, it appears that 1 out of every 486 employees was killed and 1 out of every 30 employees was injured during the year. With respect to train men, including engine men, firemen, conductors, and other train men, it appears that 1 was killed for every 165 employed, and 1 injured for every 12 employed. One passenger was killed for every 2,204,708 carried, and 1 injured for every 175,115 carried. Basing ratios upon the number of miles traveled, it appears that 55,211,440 passenger miles were accomplished for each passenger killed, and 4,385,309 passenger miles for each passenger injured.

Remains at Carnac, Brittany.—The name of Carnac in Brittany, the site of one of the most famous megalithic monuments in the world, is Breton for "the place of the cairn." As it is described by Mr. T. Cato Worsfold, just outside the town is a tumulus twenty-five feet high, evidently artificial, and surmounted with a grove of trees. This mound was excavated a few years ago; the first remains come to were Roman; then, deeper down, Celtic pottery, etc, were found, and finally flint and granite arrowheads and celts, the finds reminding one of the hill of Hissarlik, with its layers of deposits. Close alongside the mound have been found the remains of a Roman villa, with hypocaust, etc., as usual, the owner of which, living about eighteen hundred years ago, must have been an archæologist, as some flint arrowheads, celts, and prehistoric pottery were found carefully placed on shelves in one of the rooms excavated. The megalithic monuments consist of numbers of great monoliths, from twelve feet to twenty-five feet in height, dolmens, or "table stones," great flat stones laid on a number of small menhirs and forming a chamber; and the alignments or rows—eleven in number and about two miles in length—of monoliths running from west to east, and terminating in a quaint chamber at the east end. The alignments—in three divisions, meaning severally the place of incineration, the place of mourning, and the

place of the dead—consist of menhirs from two feet to twenty feet high, are sepulchral, and are evidently the work of the same race that built Avebury and Stonehenge, though data as to the time are wanting. Stonehenge is obviously the latest of the three, for the stones there are hewn out and fashioned with mortise blocks, etc., while Avebury and Carnac are rough and unhewn.

Coal-Mine Acids in the Schuylkill River.—It is shown in a paper by Prof. O. C. S. Carter that the Schuylkill River, above the city of Reading, is so strongly charged with sulphuric acid and sulphate of iron that it can not be used as a water supply, or, on account of its corroding boilers, for the generation of steam, and is very detrimental to fish, so that there are practically none in the river between Reading and Tamaqua. The acidity of the river is due to impurities found in coal. Before coal was mined in Pennsylvania the river, it is said, was free from acidity from its mouth to its source, and fish were found along its entire course. It is also said that the amount of acid in the Big Schuylkill from Pottsville and beyond has been decreasing since 1868, owing to the transfer of mining operations to the other side of the mountains, where the streams drain into the Susquehanna, and that the amount of sulphuric acid in the Big Schuylkill in 1885 was only one half of what it had formerly been. These statements can not be strictly verified for want of means of making comparative analyses, but are taken as true. Thanks to the decrease of acid, a few hardy catfish have found their way up to the region between Port Clinton and Pottsville, but no other fish; but even the catfish are not found in the river lower down, between Port Clinton and Reading, because of the discharge of acid waters by the Little Schuylkill at Port Clinton. The water loses its acid character in the vicinity of Reading, and neutralization is complete a short distance below. This is brought about by the pouring in of the hard, limestone waters of Maiden and Tulpehocken Creeks near Reading. At the mouths of these streams the sulphate of lime is precipitated by their action, rendering the water almost milky in appearance. In 1882, when a number of abandoned coal mines were opened and the excess of acid water was pumped into the river, there was more of it than the limestone streams could neutralize in the dry season; it passed far below the city of Reading, and hundreds of dead fish were observed floating in the river.

An Endless Source of Carbonic Acid.—Prof. E. W. Claypole's president's address at the last meeting of the American Microscopical Society—Microscopical Light in Geological Darkness—concerns the aid furnished by the microscope in geological study. Among the revelations afforded by means of this instrument is that which it has yielded, in the hands of Mr. H. C. Sorby, of Sheffield, England, of the existence of innumerable inclusions of liquid carbonic acid in the rocks. As investigation has gone on, the abundance of these bubbles has been more and more realized, and they are now found to be present "by myriads and by millions, and not in gems only, but in other crystalline minerals. In size they range between the one-thousandth and the fifty-thousandth of an inch, but they are so multitudinous as often to impart a white tint to the crystal, and many specimens of milky quartz owe their whiteness solely to the presence of these innumerable bubbles. In some of the Cornish granites the cavities make five per cent of the volume, and yield four pounds of the liquid to every ton of the rock." Mr. J. C. Ward is quoted as saying that more than a thousand millions of them might be contained easily within a cubic inch of quartz. The fact is used to cast light on the problem of the origin of the coal. Coal is derived from plants, which have extracted carbon from the carbonic acid of the atmosphere. Whence was that carbonic acid derived? It has been said that it was one of the original constituents of the atmosphere. But Professor Claypole adduces many reasons to show that all the carbonic acid represented in the coal beds could never have been in the atmosphere at one time. How, then, and whence, were the successive supplies introduced? Besides Mr. Sorby's experiments, those of Professor Tilden and others show that rocks of various kinds and in various localities yield gases, of which hydrogen and carbonic acid are the most abundant, in proportions ranging from 1.3 to 17.8 of the bulk of the rock, whence it may be inferred that these gases are occluded in most rocks. Now,

immense volumes of the primary rocks have been worn away by the action of water, and have furnished the material from which the sedimentary rocks are derived. This washing away has involved the breaking open of the minute reservoirs of carbonic acid, and it has gone into the atmosphere, not all at once, but gradually, so as to furnish a continuous, not excessive supply. A brief calculation presented by Professor Claypole makes it evident that the rocks would thus furnish an abundant supply, and to spare, for all the coal that is known to exist.

The Houses of Saga Times.—The construction of the dwelling houses of Saga time —A. D. 875 to 1025—has been studied in Iceland by Dr. Valtyr Gudmundsson and Thorstein Erlingsson in co-operation with Miss Cornelia Horsford, by Lieutenant Daniel Brunn, and by the Icelandic Antiquarian Society; and in Greenland by the Danish Government. The ruins of the house believed to have been built by Erik the Red, in Hawk River Valley, Iceland, and in which Leif Eriksen was probably born, as well as the ruins of other similar houses, when undisturbed, are low, grass-grown ridges and hollows, often difficult to detect, except when stones protrude through the turf. A dwelling usually consisted of three apartments—a hall or principal room, in which there was always a fireplace; a sitting room for the women, and a storeroom or pantry. These apartments were like small houses, each with a separate roof, but attached to each other with passages through the thick walls. Near by were usually one or more outhouses. The dwellings were built on the surface of the ground; the floor was of finely beaten earth. The walls were about five feet thick, and somewhat higher. The inner side was built of unhewn stones, and the interstices were filled with earth. The outer side was of alternate layers of turf and stone, and the space between the two sides was filled in with earth kneaded hard. Often, however, the walls were built entirely of layers of turf or with only disconnected rows of stones at the base. A long, narrow fireplace usually extended through the middle of the room, and was either paved or surrounded with stones standing on edge. Besides the long fire, which served to warm and light the hall, there was a small cooking fire made in the same way. The Greenland houses resembled those of Iceland, but the walls were narrower, straighter, and stronger. The dwellings were usually long and narrow, consisting of from three to eight rooms, and were surrounded by outhouses and stables for cattle, sheep, and goats; and close to them are found enormous midden heaps. A ruin is described by Miss Horsford as existing near Cambridge, Mass., bearing marks of similar construction, and is attributed by her probably to Thorfinn Karlsefin's men; and another one, ten miles or more from the settlement at Cambridge, is supposed to be of later date. Very few relics were found in the Iceland houses, but more in those of Greenland—iron nails and knives, pieces of stone vessels, spinning stones, bone combs, and stone pendants bored with holes and incised with runelike but illegible characters.

Mr. Bandelier's Explorations. — The archæological researches of Mr. Adolphe F. Bandelier in Peru and Bolivia for about six years were prosecuted at first through the liberality of Mr. Henry Villard, but since 1894 under the auspices of the American Museum of Natural History. From a very cursory summary of his work given in the American Archæologist by F. W. Hodge, it appears that from almost the moment of his arrival at Lima he observed, even in the immediate vicinity of the city, a wealth of archæological material. It was found, however, that the number of ruins was indicative of successive rather than contemporaneous occupancy. The detailed survey of the ruins proves that the cities they represent did not by any means harbor the numbers of inhabitants they have been usually believed to have contained. They were not compactly built cities, but included cultivated lots and fields occupying the greater proportion of the space. The buildings were of adobe and stone, with very thick walls. Artificial platforms and mounds are common, and tall mounds were found within the area of nearly every building examined. The aboriginal idioms have not entirely disappeared from among the natives of the Peruvian coast. Of ancient creeds and beliefs the practice of witchcraft seems to be the only vestige. Mr. Bandelier

next reconnoitered the upper course of the Marañon River on the eastern slope of the Cordillera in the Peruvian north, whence the reports about the ruins of Kue-lap had created great interest. He passed the historically celebrated town of Cajamarca; traversed in the department of Amazonas an exceedingly broken and uneven country; and secured a complete plan of Kue-lap, with a number of details, furnishing data to correct previous accounts and surveys. He also gathered a number of traditions relative to occurrences anterior even to the time when the Incas began to make raids across the Marañon. After exploring many other ruins, the political conditions in Peru becoming unpleasant, Mr. Bandelier went into Bolivia, where he spent some time on the island of Titicaca, established the height of about 14,500 feet as the uppermost limit of sedentary occupancy in ancient times on the southern side of Illimani, and examined the slopes, up to 15,400 feet, of the great peak of Ka-ka-a-ka, or Huayna Potosi. At last accounts he was preparing for a journey to Pelechuco, in the northwestern corner of Bolivia.

Temperature Levels in Lake Mendota.—Prof. E. A. Birge, of the University of Wisconsin, has been pursuing studies of the "Plankton" of Lake Mendota in that State, with a prime view to making a contribution to the natural history of an inland lake as "a unit of environment." He finds that during the summer the difference in temperature between the surface and the bottom may amount to 10°, 12°, or even 15° C., but the decline in temperature from surface to bottom is not uniform as the depth decreases. If a series of temperatures is taken about the 1st of August it will be found that there is a layer of surface water from about twenty five to forty feet in thickness, the temperature of which is nearly uniform. Immediately below this mass of warm water lies a stratum in which the decline of temperature is extremely rapid. This stratum may be from about six to ten feet thick, with a decline of nearly as many degrees centigrade per yard; or it may be only about a yard thick. This layer in which the temperature decreases rapidly may be known as the thermocline—the *Sprungschiet* of German authors. Below the thermocline the temperature decreases toward the bottom at first more rapidly and then more slowly as the depth of water increases, but never showing the sudden transitions which are characteristic for the thermocline. The thermocline was first noticed by Richter in 1891 in a study of the Alpine lakes. Its origin was attributed by him to the alternate action of the sun warming the surface in the day, followed by a cooling at night. The alternation of the conditions resulted in the formation of a layer of water of nearly uniform temperature above the colder bottom water. In Lake Mendota the concurrence of gentle winds and hot weather is essential to the formation of the thermocline. The warmth of the surface water, received from the sun, is distributed through a certain depth of the lake, a depth which is proportional to the violence of the wind and the area of the lake. In a lake of the size of Mendota the water would be of uniform temperature from top to bottom if it were always agitated by violent winds. On the other hand, if the weather were perfectly calm, the lake would be warmed only to the depth to which the rays of the sun could directly penetrate.

Curious Photographic Effects.—Since the rise into prominence in 1895 of the X-ray phenomena, there has been a greatly increased interest among physicists in the even more curious but apparently closely allied phenomena of normal physical emanations from certain surfaces which have the property of influencing the sensitive plate, and in some cases even impressing an image on such insensitive substances as glass, copper, etc. These phenomena have been variously labeled scotography, vapography, etc, but there has not as yet been sufficient insight gained into their causes to allow of a truly descriptive title. Dr. W. J. Russell, who has made this phenomenon the subject of his last two Bakerian lectures before the Royal Society, is authority for the following statements. He had previously found that zinc, other metals, wood, strawboard, and printed papers, when placed in contact with a dry plate, had a certain action on it, which enabled it to be developed as if it had been exposed to light. In his later lecture he recounts a number of additional experiments. Zinc and other materials,

when left in contact with the plate for a week, formed an image so exact that minute scratches were reproduced; the structure and rings of growth from the section of a pine tree, and even the grain of a piece of mahogany which had been in practical darkness for a couple of centuries, were transferred to the plate, with perfect fidelity. It was also found that actual contact was not necessary, the plate being affected through a considerable intervening air space, and through gelatin, gutta-percha tissue, collodion, and celluloid. Glass was found to be quite impervious. The emanations from certain uranium salts were found, however, to pass through the glass to some extent. Among the most active metals are zinc, magnesium, aluminum, nickel, lead, and bismuth. Copper and iron are practically inert. Strawboard and fresh charcoal and copal varnish act very strongly upon the plate. Pure mercury is inactive. For efficient and rapid action, a fairly high temperature (55° C.) and a perfectly clean metallic surface are necessary. Dr. Russell's views regarding the cause of this action are not definitely stated, but he seems to incline toward the theory that the effects are due to vapors given off by the objects.

MINOR PARAGRAPHS.

Dr. James Hall, the veteran geologist, one of the last survivors of the pioneers of the science in the United States, and one of the founders of the American Association, died at Echo Hill, Bethlehem, N. H., August 7th, at the ripe old age of eighty-seven years. Notwithstanding his advanced age, he was able last year to make the long journey to Russia to attend the International Geological Congress. After his return thence his health began to fail, but until a very short time before his death he intended to be present at the meeting of the American Association just held in Boston. His fame was world-wide, and his eminence as one of the leading geologists of his time was very generally recognized in Europe as well as in America. Two years ago the American Association, in Buffalo, devoted a special session to his honor. An account of his life and his work in geology was published, with a portrait, in the Popular Science Monthly for November, 1884. An account, contributed by him, of the New York State Geological Survey, his chief scientific achievement, will also be found in the Monthly for April, 1883.

Among the results of a study of the negroes of Farmville, Va., contributed by Mr. W. E. B. Dubois to the Bulletin of the Department of Labor, is the conviction of a growing differentiation of classes among these people. The study brings to light facts favorable and unfavorable, and conditions good, bad, and indifferent. One visitor might find these people idle, unreliable, careless with their money, and lewd; while another would say that they were industrious, owners of property, and slowly but steadily advancing in education and morals —according to the particular group to which his attention was most directed. The question is not whether the negro is lazy and criminal, or industrious and ambitious, but, rather, "What, in a given community, is the proportion of lazy to industrious negroes, and what is the tendency to development in these classes?" Bearing this in mind, it seems fair to conclude, after an impartial study of the Farmville conditions, that the industrious and property-accumulating class of the negro citizens "best represents, on the whole, the general tendencies of the group. At the same time, the mass of sloth and immorality is still large and threatening." One of the most encouraging signs is that "the whole group life of the Farmville negroes is pervaded by a peculiar hopefulness on the part of the people themselves. No one of them doubts in the least but that one day black people will have all rights they are now struggling for, and that the negro will be recognized among the earth's great peoples."

The recognition by Mayor Quincy, of Boston, in his welcoming address to the American Association, of the value of science in civic administration was only just, but of a kind that is rarely offered from the official side. "Your work," the mayor said, "has a very direct relation to the work in which the people of the city of Boston are engaged in their corporate capacity and the work which their municipal government is trying to prepare for them. As I regard it, the work of

good municipal government is the task of securing the practical application of the principles of science to the great fund of knowledge which has been won for us by science. I am continually impressed in my practical relation to the work of this great city with the vital relation which science bears to that work. More efficient government is to be sought along the lines of affairs which lie within the scope of our municipal government, and this is to be won for us by the investigators who have increased our knowledge of science within the last fifty years. . . . I am proud to say that we give a high place in everyday work to men of science who are giving technical application to the principles which have come to light through the investigations of abstract science. Work in the future will demand a fuller employment of men of science."

THE situation as to antarctic exploration is described by the President of the Royal Geographical Society as including a German expedition in course of organization on a liberal scale; the hope that the Norwegian Government may send out an expedition, perhaps under the leadership of Dr. Nansen; the Belgian expedition under M. de Gerlache; and the expedition under Mr. Borchgrevink, which is in an advanced state of preparation, and will shortly leave for Australia and South Victoria Land. The ship of this expedition, the Southern Cross, has been designed by the builder of the Fram, and has ten feet of solid oak at her bows, while she is thirty-two inches in thickness at her weakest point. Provision of sledges and dogs is made for the inland journey on the South Victorian continent, and the expedition will make it an object to explore that land and investigate the seas between there and Australia. Mr. Borchgrevink will take with him stores for three years and a supply of carrier pigeons.

THE vice-presidential address of Prof. Frank P. Whitman to the Physical Section of the American Association embodied a review of the present theories of color vision. The speaker regarded it as clearly proved that the number of color sensations is small, and that all hypotheses of a large number are untenable. The vision of white light is not a compound sensation, no matter how complex the light may be physically, but it is at the same time not a purely independent one, for there are some evident relations between it and vision by faint light, in which all the colors fade and tend to become white. A definite and highly probable function has been assigned to the visual purple, that of adaptation, and of causing or aiding vision in faint light. The number and variety of known human phenomena are very great and constantly increasing. Their interrelations grow every day more complex, and the actual mechanism governing those relations still remains almost entirely unknown. The various theories have at length arrived at such a stage of flexibility that, thanks to subsidiary hypotheses, almost any kind of visual result might be explainable. Perhaps the most hopeful line of research is that which, like the study of the visual purple, seeks to find a relation between color sensations and physical properties.

THE address of Prof. A. S. Packard, as chairman of the Zoölogical Section of the American Association, was devoted to a review of a Half Century of Evolution and the bearings of the theory on the problems of the nature and origin of life. The immediate effect of the acceptance of evolution on scientific study was, the speaker said, a happy one. Collectors, instead of narrowly gathering a specimen or two for their cabinets and being content therewith, are led to look at other things during their field excursions; protective mimicry, for example, or the relation of form to environment. The race of "species makers" is diminishing, while students of geographical distribution are taking their place, and the relation of form to past geographical changes is now discussed in a more philosophical way than heretofore. Speaking of the relations of new forms and new classes to geological changes, Professor Packard was careful to indicate that their probable origin lay rather in the results of the gradual extension of the land masses and the opening of new areas.

WEIGHING the merits of the various plans that have been proposed for preventing or tempering the floods of the Mississippi, Mr. William Starling finds that storage reservoirs have but little effect in reducing the height the water will reach in the stream below.

Cut-offs increase the gradient and speed of the flow, destroying the balance, and the stream rapidly excavates a new bend, restoring the former condition. Artificial outlets have as little effect on the height of the stream above as storage reservoirs on that below. The author intimates that the most effective remedy lies in levees properly constructed. The old levees, the unsoundness of which has cast a prejudice against the system, were hastily and improperly made. Stumps were left in the ground, and logs, rails, etc., were thrown into the bank, which, rotting, left holes, weak spots, that the water was sure to find. Now, all decaying material is carefully kept out, and sound earth is used—"which is a good-enough material, . . . but the bank must be carefully built of sufficient dimensions, and, especially in the case of a light or treacherous underground, must have its base extended by a banquette. As to cost, it may be briefly said that levees are the least expensive means of reclaiming overflowed lands that have ever been proposed."

THE agency of bacteria in promoting the fermentation or ripening of cheese has been recognized for some time, and has been taken practical advantage of by manufacturers. Messrs. S. M. Babcock and H. L. Russell, of the Wisconsin Agricultural Experiment Station, have, however, become satisfied that profound changes of a physical and chemical nature also occur in milk from which bacterial fermentatives have been excluded. In these experiments the casein of the milk underwent practically the same series of decomposition changes—the conversion of the insoluble casein into soluble proteids—as are to be found in a ripening cheese. From continued experiments the authors concluded that these changes were of a non-vital character, and were produced by enzymes; and by the usual physiological methods, proteid-converting (proteolytic) enzymes were separated, which, applied to milk, exercised a curdling as well as a digestive function.

A CAMBODIAN people called the Pnongs are described by M. Adhémard Leclère, French resident at Kratie, as of the type of the North American Indians, well formed, and of good appearance, but with badly shaped mouths. The women are not so handsome, strong, or intelligent as the men. The Pnongs readily learn to read and write. Their costume consists of a long shawl, which folds elegantly round the body. The children are never left alone for an instant, but are constantly attended by their father or mother. They recognize a god, whom they call Brah, but their faith seems to resolve itself into a doctrine of ghosts. They eat everything, including grasshoppers, snakes, frogs, and the placenta of cows and buffaloes. For a choice drink they make a kind of spirit of rice. They smoke in wooden pipes a mild tobacco, which they dry and cut very fine, and chew various substances. They have a highly developed sense of smell, and profess to be able to distinguish different individuals and animals, metals, and other substances, with their eyes shut. They have no dances or music, but on certain solemn occasions beat gongs; and they have no funeral ceremonies. They have an art of carving small statues. They keep their promises, and have no patience with a man who breaks his word.

NOTES.

THE United States Life-Saving Service at the close of the fiscal year covered by its latest report, June 30, 1897, embraced 259 stations—189 on the Atlantic and Gulf coasts, 55 on the coasts of the Great Lakes, 14 on the Pacific coast, and one at the Falls of the Ohio. Three hundred and ninety-four disasters were reported as having occurred during the year to documented vessels, in which 3,737 persons were exposed, 42 lives were lost, and $1,998,930 of property out of $7,107,825 was lost. There were also 305 casualties to undocumented craft—sail boats, rowboats, etc.—carrying 706 persons, 11 of whom perished, and in which $39,465 of property was lost. Five hundred and eighty-seven shipwrecked persons received 1,082 days' relief at the stations. The number of disasters is the largest reported in the history of the service, yet the number of vessels totally lost is the smallest since 1879, when the scope of the service was much less extended.

THE feat was accomplished on the first day of June, and has now become a part of the daily routine of the shops, of shipping molten iron by the ton on the railway from the blast furnaces at Duquesne to the Homestead Steel Works, near Pittsburg. The molten iron, as it is tapped from the furnaces, runs into an immense mixing ladle having a capacity of two hundred and fifty tons, and from this is poured into the twenty-ton ladle cars; and the cars are then hauled

by a locomotive to the steel works, where the direct conversion of the fluid iron into open-hearth steel is made. Between seven hundred and eight hundred tons of iron are thus dealt with every day.

THE Laboratory Fresenius at Wiesbaden, Germany, has recently passed the fiftieth year of its existence and its hundredth term, it having been founded on the first day of May, 1848. Since the death of its founder, Prof. C. Remigius Fresenius, June 11, 1898, it has been carried on by his sons, Dr. Heinrich Fresenius and Dr. Wilhelm Fresenius, and his son-in-law, Dr. Ernst Hintz, and is to be continued as before. The attendance at the winter session, 1897–'98, was equal to that of former years.

SEVERAL theories have been proposed in the attempt to explain the apparent enlargement of the sun and moon when near the horizon. M. D. Eginites, having compared the principal of them, finds none satisfactory, and that the phenomenon is not produced by any of the causes they assign. Any or all of these causes may contribute more or less to it, but not in any great degree, and the real cause is still to be sought.

PROF. O. C. MARSH, of Yale University, has recently been elected a foreign member of the London Geological Society.

MR. A. LAWRENCE ROTCH, of the Blue Hill Meteorological Observatory, Massachusetts, has been elected a foreign corresponding member of the German Meteorological Society.

DEAD Man's Island—*Isla de los Muertos*—at San Pedro, in southern California, a place of historical and scientific interest, is described by Mrs. M. Burton Williamson as "a vanishing island," the whole facies of which has been changed within a few years by the erosive power of waves and tides and winter rains. A few years ago the west side of it could not be reached except by way of the inner harbor or by climbing to the top of the island and descending a precipitous trail. Now the sea has cut an arch through the solid rock, and one can go all round the island at low tide. Within the recollection of persons now living it has diminished in area one half or more. In science it is famous for its fossil shells (Pliocene and Quaternary), of which three hundred species have been found. Some of these have been identified with species still living in the coast waters farther north.

THE tender shoots of ferns may be sporadically eaten among us, but nowhere that we know of do they form a regular article of diet in Europe or America. In Japan it is different, according to the Bulletin of the French *Jardin d'Acclimatation*, and some of the mountain people derive a large proportion of their food in some seasons from ferns. In the spring they eat the young leaves; later in the season, the starch which they extract from the roots. For this extraction they beat the washed roots with a mallet, stir the fragments in water, and precipitate the starch, using for reservoirs in the operation hollowed tree trunks. The starch obtained is equivalent to fifteen per cent of the root stuff used.

THE buffalo tree hopper is a little grass-green insect of triangular shape which is frequently found upon vegetation, and displays considerable agility in leaping when discovered. It gets its peculiar name from a supposed similarity in shape to the male buffalo. Its thorax is very wide in front, projecting in two strong horns at the sides, and is triangular, leaving the insect relatively very narrow in the rear. The hopper does great damage in orchards and gardens, through the cutting up of the limbs by the female in depositing her eggs. C. L. Marlatt, of the Department of Agriculture, has published a circular relating to it.

THE list of recent deaths includes, among men known to science, the names of Dr. Allen P. Smith, a distinguished Baltimore surgeon, and one of the original trustees of Johns Hopkins University, July 18th; A. H. B. Beale, professor of philosophy and education in the University of Washington, killed by a fall, July 18th; Dr. William Pepper, provost of the University of Pennsylvania from 1881 till 1894, and afterward professor in it of the theory and practice of medicine, and author of many works on medical and other subjects, at San Francisco, July 28th, aged fifty-five years; Dr. E. L. Sturtevant, an eminent scientific agriculturist, at Framingham, Mass., July 30th, aged fifty-six years; Prof. John Caird, an eminent philosophical writer, at Glasgow, Scotland, July 30th, aged seventy-eight years; Prof. James Hall, the oldest of American geologists, near Bethlehem, N. H., August 7th, in his eighty-seventh year; Georg Maurice Ebers, an eminent Egyptologist and author of numerous historical novels, near Munich, Bavaria, aged sixty-one years; Adolph Sutro, constructor of the Sutro Tunnel and deviser of a tidal water power, who made many gifts to education, at San Francisco; M. Émile Roger, retired inspector of mines in France and author of studies concerning the respective distances of the planets and their satellites; Prof. J. C. Fillmore, of Pomona College, California, ethnologist, at Taftville, Conn., on his way to the meeting of the American Association, where he was to read a paper on The Harmonic Structure of Indian Music, August 14th; Dr. Axel Blytt, professor of botany at Christiania, Norway, aged fifty-four years; Dr. Carlo Giacomini, professor of anatomy at Turin, July 15th; and Dr. Ernest Candez, student of coleoptera, near Lüttich, June 20th.

INDEX.

ARTICLES MARKED WITH AN ASTERISK ARE ILLUSTRATED.

PAGE

Adam Smith and Astronomy. (Frag.) 717
Adulteration with Antiseptics. (Frag.) 283
Agnesi, Maria. Sketch. (With Portrait.) M. J. Boyer 403
Alaska, The Climate of. (Frag.) 568
Allen, Grant. The Romance of Race 511
American Association, The, for 1898. (Frag.) 138
American Professor, The. (Frag.) 425
Ancestral Survivals in Domesticated Animals. (Frag.) 141
Angstman, Charlotte S. College Women and the New Science 674
Anthropology. Literature of the African Negroes. M. Muret 241
" The Romance of Race. Grant Allen 511
Archæology a True Science. (Frag.) 282
" Christianized Megalithic Monuments. M. de Mortillet *. 668
" Mr. Bandelier's Explorations. (Frag.) 859
" Remains at Carnac, Brittany. (Frag.) 857
" The Houses of Saga Times. (Frag.) 859
Areca and its Properties. (Frag.) 427
Art, Decorative, of the Northwestern Indians. (Frag.) 137
" Tolstoi on. (Table) 553
Association, the American, The Boston Meeting of. (Table) 842
" " The First Half Century of. Prof. Daniel S. Martin 822
" " Officers of the. (Frag.) 854
Astrology, A Relic of. H. C. Bolton 83
Astronomy, Adam Smith and. (Frag.) 717
" The Aurora. W. F. Felch 467
" Total Eclipse at Viziadrug. (Frag.) 568
Atavism, The Secret of. F. L. Oswald 192
Atkinson, Edward. The Evolution of High Wages from Low Cost of Labor 746
Aurora, The. W. Farrand Felch * 467

Bacteria, Economical Uses of. (Frag.) 427
Badenoch, Margaret T. D. The Case Moths * 656
Ballou, William H. The Serpentlike Sea Saurians * 209
Balnibarbian Glumtrap Rhyme. (Poem.) (Frag.) 567
Barr, Dr. M. W. Training of Mentally Deficient Children 531
Bentley, W. A., and G. H. Perkins. A Study of Snow Crystals * 75
Berthelot, M. P. E. The Genealogy of Chemistry 535

PAGE

Books Noticed..... 127, 273, 416, 558, 708, 845

American Agriculturist, The, Yearbook and Almanac for 1898, 852.
Anthropology. Brown Men and Women. E. Reeves, 562.
— The Study of Man. Prof. Alfred C. Haddon, 849.
Argentine Meteorological Annals for 1893, 713.
Argumentation, The Essentials of. E. J. MacEwan, 711.
Astronomy. Clerke, Agnes M., etc, 421.
— for Beginners. D. P. Todd, 422.
— The Sun's Place in Nature. N. Lockyer, 130.
Audubon and his Journals. M. R. Audubon, 273.
Bailey, G. H. Tutorial Chemistry, Part II, 420.
— L. H. Garden Making, 421.
— L. H. Lessons with Plants, 277.
— L. H. The Pruning Book, 563.
Botany, A Laboratory Manual of Practical. C. H. Clark, 560.
— Illustrated Places of the Northern United States, Canada, and the British Possessions. N. L. Britton and A. Brown, 851.
— Lessons with Plants. L. H. Bailey, 277.
— Minnesota Botanical Studies, Part XII. Conway MacMillan, 852.
— Phylogeny and Taxonomy of Angiosperms, The, 563.
— Pruning Book, The. L. H. Bailey, 563.
— Text-Book of. Dr. E. Strasburger, etc., 558.
— Text-Book of General. C. C. Curtis, 130.
— The Plant World (monthly), 564.
Britton, Nathaniel Lord, and Brown, Hon. Addison. An Illustrated Flora of the United States and Canada, 851.
Brown, John. Parasitic Wealth, or Money Reform, 422.
Butts, E. L. Manual of Physical Drill, 132.
Chemistry. Freezing Point, Boiling Point, and Conductivity Methods. H. C. Jones, 422.
— Methods for the Analysis of Ores, etc., 563.
— Organic Laboratory Experiments in. Noyes and Mulliken, 421.
— Platinum Group, Bibliography of the Metals of the. Prof. J. L. Howe, 853.
— Tutorial. G. H. Bailey, 420.
Clark, Charles H. A Laboratory Manual of Practical Botany, 560.
Clarke, R. Floyd. The Science of Law and Lawmaking, 561.
Clerke, Agnes M. Astronomy, 421.
Climatological Association, Transactions of the Fourteenth Annual Meeting of (1897), 278.
Conn, H. W. Story of Germ Life, 564.
Croll, James. Autobiographical Sketch of. J. C. Irons, 418.
Crusoe's Island. F. A. Ober, 279.
Curtis, C. C. Text-Book of General Botany, 130.
Davidson, Thomas. Rousseau and Education according to Nature, 848.
Day, D. T. Mineral Resources of the United States, Report for 1895, 277.
Demoor, J. L'Évolution Regressive en Biologie et en Sociologie, 712.
Education. Report of the United States Commissioner for 1895–'96, 133.
— The Psychologic Foundations of. W. T. Harris, 850.
— The School System of the State of New York. John C. Miller, 849.
— Rousseau and, according to Nature. Thomas Davidson, 848.
— The Study of Children and their School Training. F. Warner, 276.
Entomology, A Text-Book of. A. S. Packard, 710.
Ethnology, Sixteenth Annual Report of the Bureau of American, 134.
Evans, E. P. Evolutional Ethics and Animal Psychology, 416.
Evolutional Ethics and Animal Psychology. E. P. Evans, 416.
Evolution and Aristocracy. W. H. Mallock, 417.
— Individuelle et Hérédité. F. Le Dantec, 419.
Fairhurst, A. Organic Evolution considered, 563.
Fairlie, John Archibald. The Centralization of Administration in New York State, 852.
Fish Culture, A Manual of, 132.
— La Culture des Mers en Europe. Roché, Georges, 851.
Fiske, John. Old Virginia and her Neighbors, 127.
Fitzhugh, T. Philosophy of the Humanities, 712.
Forester, The, 422.
Frankland, Percy, etc. Pasteur, 560.
Garden Making. L. H. Bailey, 421.
Garnett, Richard. A History of Italian Literature, 562.
Geology, A Bibliography and Index of North American, for 1892–'93. T. B. Weeks, 712.
— Amboy Clays of New Jersey, 278.
— Annual Report for 1896. Iowa Geological Survey, 276.
— Lake Agassiz. United States Geological Survey, 277.
— Marquette Iron-bearing District of Michigan, 278.
— No. 4, Vol. II. Bulletin of the University of Upsala, Sweden, 133.
Gerhard, William P. Sanitary Engineering, 564.
Gosse, Edmund. Short History of Modern English Literature, 275.
Haddon, Prof. Alfred C. The Study of Man, 849.

Books Noticed :

Halsted, B. D. Fungous Foes of the Farmer, 564.
Harris, George. Inequality and Progress, 274.
Harris, W. T. The Psychologic Foundations of Education, 850.
Hegel, The Secret of. J. H. Sterling, 419.
Henderson, John. Practical Electricity and Magnetism, 561.
Hickson, S. J. The Story of Life in the Seas, 852.
History. Old Virginia and her Neighbors, 127.
— The Earth's, Outlines of. N. S. Shaler, 848.
Howe, Prof. J. Lewis. Bibliography of the Metals of the Platinum Groups, 853.
International Nomenclature, Code of, 278.
Iowa Geological Survey. Report for 1896, 276.
Irons, J. C. Autobiographical Sketch of James Croll, 418.
Italian Literature, A History of. Richard Garnett, 562.
Italians in Chicago, The, 278.
Jones, H. C. Freezing Point, etc., 422.
Kansas Academy of Sciences, Transactions, 853.
Ladd, G. T. Outlines of Descriptive Psychology, 420.
Lake Agassiz, Two Monographs on. United States Geological Survey, 277.
Law and Lawmaking, The Science of. R. Floyd Clarke, 561.
Le Dantec, Félix. Evolution individuelle et Hérédité, 419.
Literature, Modern English, Short History of. Edmund Gosse, 275.
Lockyer, Sir N. The Sun's Place in Nature, 130.
Loltun, The Cave of, 277.
MacEwan, E. J. The Essentials of Argumentation, 711.
Mach, Dr. E. Popular Scientific Lectures, 134.
MacMillan, Conway. Minnesota Botanical Studies, Part XII, 852.
Mallock, W. H. Aristocracy and Evolution, 417.
Mann, Newton M. The Evolution of a Sentiment, 563.
Merriam, Florence. Birds of Village and Field, 276.
Meteorology. Annals of the Argentine Meteorological Society for 1893, 713.
Microscopical Society. Transactions of the Nineteenth Annual Meeting of the American Society, 133.
Miller, John. The School System of the State of New York, 849.
Miller, Prof. Walter. Scientific Names of Greek and Latin Derivation, 852.
Murché, V. T. Six Science Readers, 134.
Natural History. Bird Craft. M. O. Wright, 274.
Natural History. Birds of the Philippine and Palawan Islands. Prof. D. C. Worcester and F. A. Bourns, 852.
— Birds of Village and Field. F. Merriam, 276.
— Bird Studies. William E. D. Scott, 559.
Noyes and Mulliken. Laboratory Experiments in Organic Chemistry, 421.
Ober, F. A. Crusoe's Island, 279.
Oppenheim, N. Development of the Child, 710.
Packard, A. S. Text-Book of Entomology, 710.
Parker, T. Jeffery, and Haswell, William A. A Text-Book of Zoölogy, 847.
Parker, Francis W. Uncle Robert's Visit, 134.
Pasteur. Percy Frankland, etc., 560.
Peary Expedition. Report on Scientific Work of, 279.
Philosophy of Phenomena. G. M. Ramsey, 419.
— Studies of Good and Evil. J. Royce, 711.
Photography, The Story of. Alfred T. Story, 851.
Physics. Electricity and Magnetism, Practical. J. Henderson, 561.
Political Crime. Louis Proal, 708.
Proal, Louis. Political Crime, 708.
Psychology, A Primer of. E. B. Titchener, 420.
— Child, Development of the, 710.
— Outlines of Descriptive. G. T. Ladd, 420.
— The, of Suggestion, 131.
Ramsey, G. M. Philosophy of Phenomena, 419.
Reeves, Edward. Brown Men and Women, 562.
Roché, Georges. La Culture des Mers en Europe, 851.
Royce, Josiah. Studies of Good and Evil, 711.
Sanitary Engineering. William P. Gerhard, 564.
Scientific Names of Greek and Latin Derivation. Prof. Walter Miller, 852.
Scott, William E. D. Bird Studies, 559.
Shaler, Nathaniel Southgate. Outlines of the Earth's History, 848.
Sidis, Boris. The Psychology of Suggestion, 131.
Smith, Goldwin. Guesses at the Riddle of Existence, 559.
Smithsonian Institution, The, 129.
Sociology. Inequality and Progress. George Harris, 274.
— Outlines of. Lester F. Ward, 845.
— The Centralization of Administration in New York State. J. A. Fairlie, 852.
— The Italians in Chicago, 278.
Starr, Frederick. Little Pottery Objects of Lake Chapala, Mexico. 564.
Stirling, J. H. The Secret of Hegel, 419.
Story, Alfred T. The Story of Photography, 851.

Books Noticed : PAGE

Strasburger, Dr. E., etc. A Text-Book of Botany, 558.
Teall, F. H. Punctuation, etc., 133.
Thwaites, R. G. Afloat on the Ohio, 131.
Titchener, E. B. A Primer of Psychology, 420.
Todd, D. P. Astronomy for Beginners, 422.
Travel. Crusoe's Island. F. A. Ober, 379.
Vincent, Frank. The Animal World, 422.
Warner, Francis. The Study of Children and their School Training, 276.
Ward, Lester F. Outlines of Sociology, 845.
Wealth, Parasitic, or Money Reform. John Brown, 422.
Weeks, F. B. A Bibliography of North American Geology, Paleontology, and Mineralogy for 1892–'93, 712.
Willey, F. O. The Laborer and the Capitalist, 561.
Worcester, Prof. Dean C., and Bourns, Frank A. Birds of the Philippine and Palawan Islands, 852.
Wright, M. O. Bird Craft, 274.
Zoölogy, A Text-Book of. T. Jeffery Parker and William A. Haswell, 847.
— The Animal World. Frank Vincent, 422.
— The Story of Life in the Seas. S. J. Hickson, 852.

Bolton, H. C. A Relic of Astrology 83
" Henrietta I. Women in Science 506
Botany. Gerarde and the Gerardias. M. B. Flint 395
" Plant Life of the Canary Islands.* Alice Carter Cook 758
" The Place of Plant Physiology. (Frag.) 856
Bounties and the Extermination of Noxious Animals. (Frag.) 140
Boyer, M. J. Sketch (with Portrait) of Maria Agnesi 403
Buckland, Dean, and the Heart of Louis XIV. (Corr.) 122

Cambodia, Superstition and Magic in. M. A. Leclère 525
Canary Islands, the, Plant Life of.* Alice Carter Cook 758
Carbonic Acid, An Endless Source of. (Frag.) 858
Carnac, Brittany, Remains at. (Frag.) 857
Case Moths, The. Margaret T. D. Badenoch* 656
Ceylon, Ancient Monuments of. (Frag.) 141
Chemistry. Carbonic Acid, An Endless Source of. (Frag.) 858
" Hydrogen, Liquefaction of. (Frag.) 715
" New Elements. (Frag.) 855
" New Elements in the Atmosphere, More 573
" The Genealogy of. M. P. E. Berthelot 535
Children's Ideals. A Study of. E. M. Darrah 88
Child Training. (Frag.) 140
Chinese Oil Tree, The. (Frag.) 137
Chittenden, R. H. Sketch. (With Portrait) 115
Christianized Megalithic Monuments. M. de Mortillet* 668
College Women and the New Science. Charlotte S. Angstman 674
Collier, James. The Evolution of Colonies 289, 452, 620, 806
Colonies, The Evolution of. James Collier 289, 452, 620, 806
Competition and Socialism. (Corr.) 701
" and the Golden Rule. (Table) 267
Cook, Alice Carter. Plant Life of the Canary Islands.* 758
Cram, William E. Woodpeckers and their Ways* 339
Curiosities of American Coinage. A. E. Outerbridge, Jr.* 593

Darrah, Estelle M. A Study of Children's Ideals 88
Demerara Negroes, Customs of. (Frag.) 284
Dinner in the "Zoo." (Frag.) 286
Dooley, Clarke. Sketch of Charles Goodyear. (With Portrait) 690
Dorsey, George A. A Cruise among Haida and Tlingit Villages* 160

PAGE

Educational Heretic, An. (Table) 128
Education. A Study of Children's Ideals. E. M. Darrah..... 88
" Child Training. (Frag.)..... 140
" Elective System in Colleges, Working of the. (Frag.).. 718
" for Domestic Life. Mary R. Smith..... 521
" International Language Study. (Frag.)..... 714
" New Features in School. (Frag.)..... 718
" Scientific Instruction in Girls' Schools. (Table)..... 413
" The American Professor. (Frag.)..... 425
" The Philosophy of Manual Training. C. H. Henderson..... 145, 322, 490, 638, 772
" Training of Mentally Deficient Children. M. W. Barr.. 531
" Young Greek Boys and Old Greek Schools. Frederic E. Whitaker..... 809
Elective System in Colleges, Working of the. (Frag.)..... 718
Entomology. Insects, and Books about them. (Frag.)..... 426
Epicurean Cats and Dogs. (Frag.) 569
Eskimo Lamp, The. (Frag.)..... 571
Ethnology. Eskimo Lamp, The. (Frag.)..... 571
Evans, E. P. Witchcraft in Bavaria..... 30
Evolution, The, of Colonies. James Collier..... 289, 452, 620, 806
Eye Language. Louis Robinson..... 364

Fasting Frog, A. (Corr.) 122
Felch, W. Farrand. The Aurora*..... 467
Field Columbian Museum, The. (Frag.)..... 568
Flint, Martha B. Gerarde and the Gerardias..... 395
Folklore of the Yew Tree. (Frag.)..... 136
Ford, W. C. The Question of Wheat. II. France..... 1
III. Russia..... 351

Gallouédec, M. L, Man's Dependence on the Earth 99
Gems, Our Native. (Frag.) 716
Geological Water Ways across Central America. J. W. Spencer *.. 577
Geology. Geyser Formation, A New Theory of..... 572
" The West Indian Bridge between North and South America. J. W. Spencer *..... 10
" Topographic Features due to Landslides. L. C. Russell *. 480
Gerarde and the Gerardias. Martha B. Flint..... 395
Geyser Formation, A New Theory of. (Frag.)..... 572
Goodyear, Charles. Sketch. (With Portrait.) Clark Dooley..... 690
Grasses in Iowa, Nebraska, and Colorado. (Frag.)..... 715
Grasshoppers, North American. (Frag.)..... 428
Great Country, A. (Table)..... 556
Greek Boys, Young, and Old Greek Schools. Frederic E. Whitaker. 809
Growth and Decay of Nations, The. (Frag.)..... 716
Gulick, Luther, M. D. Some Psychical Aspects of Muscular Exercise. 793

Haida and Tlingit Villages, A Cruise among. George A. Dorsey..... 160
Heilprin, A. Aspects of Nature in the Sahara. II.* 174

PAGE

Henderson, C. H. The Philosophy of Manual Training. 145, 322, 490, 638, 772
Henri, Victor and Catharine. Earliest Recollections 108
Hide and Seek, A Game of. C. M. Weed *..... 661
Holophane Globe, The. (Frag.)..... 569
Hoppe-Seyler, Felix. Sketch. (With Portrait,) A. P. Matthews.... 542
Houses, The, of Saga Times. (Frag.)..... 859
Howard, W. L. The Physiology of Strength and Endurance..... 187
Hudson, W. H. Veracity..... 196
Hydrogen, Liquefaction of. (Frag.)..... 715
Hygiene of a Natural Life. (Frag.)..... 281

Insects, and Books about them. (Frag.) 426
International Language Study. (Frag.) 714

Kite Flying in 1897. George J. Varney *..... 48

Landslides, Topographic Features due to. I. C. Russell *..... 480
Latimer, Caroline W. Scientific Instruction in Girls' Schools..... 246
Laughter, The Psychological Cause of. M. C. Méllinand 398
Leclère, M. Adhémard. Superstition and Magic in Cambodia..... 525
Libraries, Free Traveling, in Wisconsin. (Frag.)..... 281
Literature of the African Negroes. M. Muret..... 241
Living and Dying Nations. (Table)..... 705

McAnally, D. R. The Roman Highways..... 255
Man's Dependence on the Earth. M. L. Gallouédec..... 99
Manual Training, The Philosophy of. C. H. Henderson. 145, 322, 490, 638, 772
Martin, Prof. Daniel S. The First Half Century of the American Association 822
Matthews, A. P. Sketch (with Portrait) of Felix Hoppe-Seyler..... 542
Mauna Loa, On the Summit of. (Frag.)..... 138
Medicine. Revaccination. (Frag.)..... 570
Méllinand, M. C. The Psychological Cause of Laughter..... 398
Mentally Deficient Children, The Training of. M. W. Barr..... 531
Meteorology. Alaska, The Climate of. (Frag.)..... 568
" A Study of Snow Crystals. W. A. Bentley and G. H. Perkins *..... 75
" Kite Flying in 1897. G. J. Varney *..... 48
" Weather Forecasts. E. J. Prindle *..... 307
" Weather Freaks of the West Indies. F. L. Oswald... 789
Micheli, M. Horace. Nationalization of the Swiss Railroads..... 609
Militarism, A Victim of. (Table)..... 271
Milk, The Filtration of. (Frag.)..... 425
Minchin, G. M. Balnibarbian Glumtrap Rhyme. (Poem.) (Frag.). 567
Minerals, History in. (Frag.)..... 284
Morals. Veracity. William H. Hudson..... 196
Mortillet, M. de. Christianized Megalithic Monuments *..... 668
Muret, M. Literature of the African Negroes 241

PAGE
Muscular Exercise, Some Psychical Aspects of. Luther Gulick, M. D. 793
Mythology. A Relic of Astrology. H. C. Bolton 83

Nation's Crisis, The. A. B. Ronne 633
Natural History. A Paradise for Wild Animals. (Frag.) 855
" Case Moths, The. M. T. D. Badenoch * 656
" Epicurean Cats and Dogs. (Frag.) 569
" Hide and Seek, A Game of. C. M. Weed * 661
" Woodpeckers and their Ways. William E. Cram * 339
Naturalist, An Old-time, and his Guests. (Frag.) 280
Nature Study for Farmers. (Frag.) 139
New Elements in the Atmosphere, More. (Frag.) 573
New York State Library, The. (Frag.) 717

Oswald, F. L. The Secret of Atavism 192
" " Weather Freaks of the West Indies 789
Outerbridge, A. E., Jr. Curiosities of American Coinage * 593

Paleontology. Saber-toothed Cats. S. W. Williston * 348
" The Serpentlike Sea Saurians. W. H. Ballou * 209
Paper Making, Materials for. (Frag.) 572
Paradise, A, for Wild Animals. (Frag.) 855
Peace as a Factor in Social and Political Reform. F. Smith 225
Photography, Animated, An Episode in the Early History of. (Frag.) 424
" Astronomical, Growth of. (Frag.) 854
" Curious Photographic Effects. (Frag.) 860
" Some Uses of the Camera in Zoölogy. R. W. Shufeldt. * 443
Physics. Holophane Globe, The. (Frag.) 569
Physiology. The Physiology of Strength and Endurance. W. L. Howard 187
" The Secret of Atavism. F. L. Oswald 192
Plant Physiology, The Place of. (Frag.) 856
Play and Development. (Frag.) 856
Popocatepetl. (Frag.) 570
Predeterminate Selection. (Frag.) 136
Prindle, E. J. Weather Forecasts * 307
Printing, The Invention of. (Frag.) 428
Prophecy, Realization of a, of Mr. Spencer. (Table) 124
Psychology, Earliest Recollections. Victor and Catharine Henri 108
" Laughter, The Psychological Cause of. M. C. Méllinand. 398
" Some Psychical Aspects of Muscular Exercise. Luther Gulick, M. D 793

Quain, Sir Richard. Sketch. (With Portrait) 835

Race, The Romance of. Grant Allen 511
Racial Geography of Europe, The. W. Z. Ripley * 721
Ramsay, A. C. Sketch. (With Portrait) 259
Revaccination. (Frag.) 570
Ripley, W. Z. The Racial Geography of Europe * 721

PAGE
Robinson, Louis. Eye Language 364
Roman Highways. D. R. McAnally 255
Ronne, A. B. The Nation's Crisis 633
Russell, I. C. Topographic Features due to Landslides *..... 480

Saber-toothed Cats. S. W. Williston * 348
Sahara, Aspects of Nature in. II. A. Heilprin * 174
Sapphires, Montana. (Frag.) 425
School, New Features in. (Frag.) 718
Schuylkill River, the, Coal-Mine Acids in. (Frag.) 858
Science and its Critics. (Table) 411
" Women in. H. I. Bolton 506
Scientific Instruction in Girls' Schools. C. W. Latimer 246
(Also Table) 413
Scientific Temper and the Need of the Times. (Table) 270
Serpentlike Sea Saurians, The. William H. Ballou * 209
Shufeldt, R. W. Uses of the Camera in Zoölogy * 443
Smith, F. Peace as a Factor in Social and Political Reform 225
" Mary R. Education for Domestic Life 521
Smithsonian Institution, Work of. (Frag.) 285
Smoke, Abatement of. (Frag.) 142
Snow Crystals, A Study of. W. A. Bentley and G. H. Perkins * 75
Socialism and Competition. (Table) 702
Society, Modern, The Conflict of. (Table) 840
Sociology. A Victim of Militarism. (Table) 271
" Competition and the Golden Rule. (Table) 267
" Peace as a Factor in Social and Political Reform. F. Smith 225
" The Evolution of High Wages from Low Cost of Labor. Edward Atkinson 746
Spencer, J. W. Geological Water Ways across Central America * ... 577
" J. W. The West Indian Bridge between North and South America * 10
Spencer's Teleology. (Corr.) 410
Spinning, Hand. (Frag.) 139
Spirit Drinking and Mental Depression. (Frag.) 426
Strength and Endurance, The Physiology of. W. L. Howard 187
Sudden Death, Causes of. (Frag.) 285
Swiss Railroads, Nationalization of. M. Horace Micheli 609

Taxation, Principles of. D. A. Wells 64, 372, 433
Teleology, Spencer's. (Corr.) 410
Telescope Glasses, Advantages of Large. (Frag.) 717
Temperature Levels in Lake Mendota. (Frag.) 860
Tobacco Pipes, Variety in. (Frag.) 283
Tolstoi on Art. (Table) 553
Tornado's Work on Trees, A. (Frag.) 282
Total Eclipse, The, at Viziadrug. (Frag.) 568
Travel. A Cruise among Haida and Tlingit Villages. G. A. Dorsey * 160
" Aspects of Nature in the Sahara. II. A. Heilprin * 174
Trees in Tennessee. (Frag.) 428

PAGE

United States Railway Statistics. (Frag.)..... 857

Varney, G. J. Kite Flying in 1897 *..... 48
Veracity. W. H. Hudson..... 196

Wages, High, The Evolution of, from Low Cost of Labor. Edward Atkinson..... 746
Weather Forecasts. E. J. Prindle *..... 307
Weed, C. M. A Game of Hide and Seek *..... 661
Wells, D. A. Principles of Taxation..... 64, 372, 433
West Indian Bridge, The, between North and South America. J. W. Spencer *..... 10
West Indies, Weather Freaks of the. F. L. Oswald..... 789
Wheat, The Question of. II. France. W. C. Ford..... 1
III. Russia..... 351
Whitaker, Frederic E. Young Greek Boys and Old Greek Schools.. 809
Williston, S. W. Saber-toothed Cats *..... 348
Witchcraft in Bavaria. E. P. Evans..... 30
Women in Science. H. I. Bolton..... 506
" Opposed to Woman Suffrage. (Frag.)..... 428
Woodpeckers and their Ways. William E. Cram *..... 339

Zoölogy, Some Uses of the Camera in. R. W. Shufeldt *..... 443

THE END.

UNIV. OF MICH.
1 OCT 1898

VOL. LIII.] ESTABLISHED BY EDWARD L. YOUMANS. [No. 6.

APPLETONS' POPULAR SCIENCE MONTHLY.

OCTOBER, 1898.

EDITED BY WILLIAM JAY YOUMANS.

CONTENTS.

PAGE

I. The Racial Geography of Europe. Russia and the Slavs. By Prof. WILLIAM Z. RIPLEY. (Illustrated.) 721
II. Evolution of High Wages from Low Cost of Labor. By E. ATKINSON. 746
III. Plant Life of the Canary Islands. By ALICE C. COOK. (Illus.) ... 758
IV. The Philosophy of Manual Training. V. Its Place in a Rational Educational System. By Prof. C. HANFORD HENDERSON 772
V. Weather Freaks of the West Indies. By Dr. FELIX L. OSWALD .. 789
VI. Some Psychical Aspects of Muscular Exercise. By L. GULICK, M. D. 793
VII. The Evolution of Colonies. IV. The Law. By JAMES COLLIER .. 806
VIII. Young Greek Boys and Old Greek Schools. By FREDERIC E. WHITAKER, M. A. 809
IX. The First Half Century of the American Association. By Prof. DANIEL S. MARTIN 822
X. Sketch of Sir Richard Quain. (With Portrait.) 835
XI. Editor's Table: The Conflict of Modern Society.—The Boston Meeting of the American Association 840
XII. Scientific Literature 845
XIII. Fragments of Science 854
XIV. Index to Vol. LIII 865

NEW YORK:
D. APPLETON AND COMPANY,
72 FIFTH AVENUE.

SINGLE NUMBER, 50 CENTS. YEARLY SUBSCRIPTION, $5.00.

COPYRIGHT, 1898, BY D. APPLETON AND COMPANY.
Entered at the Post Office at New York, and admitted for transmission through the mails at second-class rates.

TRAVEL AND BIOGRAPHY.

THE LIFE OF NAPOLEON III.

By ARCHIBALD FORBES. With about 40 illustrations of great interest, many of them being reproductions of rare paintings, engravings, photographs, etc. 8vo, cloth, handsomely bound $3.50

The task of writing a popular biography of this kind could not have fallen into more capable hands than those of Mr. Archibald Forbes. He has given us a most fluently written account of Napoleon, and is, in this work, quite the forcible, descriptive writer whom we have all admired in his novels.

HOLLAND AND THE HOLLANDERS.

By DAVID STORRAR MELDRUM, author of "The Story of Margredel." Profusely illustrated. Small 8vo $2.00

Mr. Meldrum has had unusual opportunities for knowing the land of which he tells in this most delightful book. While quite different from De Amicis's charming sketch, it is likely, in a way, to supersede it. Without being statistical, it is full of exact and comprehensive information not only about the country in its ordinary aspects, but its people and institutions.

THROUGH CHINA WITH A CAMERA.

By JOHN THOMSON, F. R. G. S. Illustrated with over 100 reproductions of photographs taken especially for the work . . . . . net, $5.00

This book contains by far the finest collection of photographs of Oriental life and scenery we have ever seen. The camera accompanied Mr. Thomson in all his travels, and the account of difficulties under which many of his wonderful pictures were taken is not the least interesting part of his narrative. It is the best book we know of its kind.

HAWAII IN TIME OF REVOLUTION.

By MARY H. KROUT. Small 8vo, cloth, with illustrations $2.00

Many and varied are the books that have been written about the Sandwich Islands, but we believe that no one has taken quite the same point of view as Miss Krout in her book about Hawaii. The author went to the islands as war correspondent for a newspaper soon after the outbreak of the recent revolution, and the journey was undertaken in the face of many obstacles and at much personal risk and inconvenience.

AFRICA, ITS PARTITION AND ITS FUTURE.

By HENRY M STANLEY, J. SCOTT KELTIE, Sir GEORGE T. GOLDIE, and others foremost in African affairs. 12mo, cloth, with a new map in colors . $1.25

In this book a dozen of the men most qualified to do it graphically describe how Africa has been partitioned, why the European powers are such eager rivals for its territory, what their colonial powers and ambitions are, and give the latest, clearest, and most satisfactory account of Europe in Africa yet attempted. There are also some prophetic forecasts of conditions in Africa in the twentieth century.

THE STORY OF TWO NOBLE LIVES.

Charlotte, Countess Canning, and Louisa, Marchioness of Waterford. By AUGUSTUS J. C. HARE. Three volumes, with many illustrations (new edition) . net, $8.00

EGYPT IN 1898.

By G. W. STEEVENS, author of "The Land of the Dollar," "The Conquering Turk," etc. Crown 8vo, with 16 illustrations $1.50

Mr. Steevens, the famous correspondent of the *London Daily Mail*, in this volume describes in his inimitable manner his sojourn in modern Egypt. He has a penetrating glance for character as well as for the externals of things, and the book is full of bright passages. It is a survey of the Egypt of to-day in its social, political, and economic aspects, and gives in a most entertaining way an insight into the present conditions in that most interesting part of the world.

THE HITTITES AND THEIR LANGUAGE.

By Lieut.-Col. C. R. CONDER, author of "Tent-Work in Palestine," etc. With numerous facsimiles of inscriptions on monuments, and a map. 8vo, cloth . $2.50

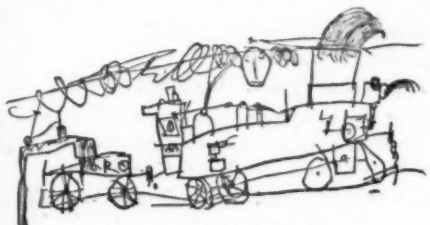
Contents: Early History—The Egyptian Conquests in Syria—The Assyrian Conquests in Syria—The Races of Western Asia—Mongol Gods and Beliefs—Mongol Hieroglyphics.

DODD, MEAD & COMPANY, Publishers, New York.

Harper & Brothers' New Books

BIOGRAPHICAL EDITION OF THACKERAY

Volume 6. **Contributions to "Punch."** Crown 8vo, Cloth, Uncut Edges and Gilt Top, $1 75.



A DRAWING BY THE CHILD

A STUDY OF A CHILD

By LOUISE E. HOGAN. With a Colored Frontispiece and Many Illustrations by the Child. Crown 8vo, Cloth, Ornamental, $2 50.

BY ORDER OF THE MAGISTRATE

By W. PETT RIDGE, Author of "The Second Opportunity of Mr. Staplehurst," etc. Post 8vo, Cloth, Ornamental, $1 25.

RODEN'S CORNER

A Novel. By HENRY SETON MERRIMAN, Author of "The Sowers," etc. With Illustrations by T. DE THULSTRUP. Post 8vo, Cloth, Ornamental, $1 75.

CHINA IN TRANSFORMATION

By ARCHIBALD R. COLQUHOUN. With Frontispiece, Maps, and Diagrams. 8vo, Cloth, $3 00.

A CONSTITUTIONAL HISTORY

of the American People, 1776-1850. By FRANCIS NEWTON THORPE. Illustrated with Maps. Two Volumes. Crown 8vo, Cloth, Uncut Edges and Gilt Tops, $5 00.

PHASES OF AN INFERIOR PLANET

A Novel. By ELLEN GLASGOW, Author of "The Descendant." Post 8vo, Cloth, Ornamental, $1 25.

THE GOLFER'S ALPHABET

Pictures by A. B. FROST. Verses by W. G. VAN T. SUTPHEN. Small 4to, Illuminated Boards, $1 50.

New York **HARPER & BROTHERS, Publishers** London

SCRIBNERS' NEWEST BOOKS.

THIRD VOLUME, COMPLETING THE WORK, JUST READY.

An Illustrated Flora of the Northern United States and Canada,

Virginia to Kansas included. By Prof. NATHANIEL L. BRITTON and Hon. ADDISON BROWN, with the assistance of Specialists in Various Groups. Every known species illustrated, numbering 4162. In three Imperial 8vo volumes of about 620 pages each. The set, $9.00 *special net*, transportation extra. (Those already having Volumes I. and II. can secure Volume III. for $3.00 *special net*; postage 36 cents extra.)

Volume I. Pp. xii+612; figured species, 1425 uncolored. Ferns to Carpet-Weed.

Volume II. Pp. iv+643; figures 1426 to 2892. Portulaca to Gentian.

Volume III. Pp. xvi+588; figures 2893 to 4081. Appendix 81 figures. Dogbane to Thistle.

Volume III. contains a general key to the Orders and Families, a Glossary, and Latin and English Indexes to the three volumes, including about 10,000 popular names. The Indexes are also supplied separately, in a uniform Index Volume of 84 pages, at $1.00 *net*, postage nine cents extra.

"The modern nomenclature, . . . and the modern sequence of families, . . . distinguish this from every other systematic work on the plants of North America."—*Science.*

"The praise which the first two volumes received has been fully warranted as shown by the completion of the work. For comprehensiveness, clearness, accuracy, and excellence of typographical appearance it is unsurpassed. . . . The work is fully up to date and thoroughly covers the field. . . . The list of popular English names embraces all our plant names commonly used by pharmacists, horticulturists, and plant collectors, or likely to be met with in botanical or current literature. No similar compilation of American plant names has hitherto been published. Many of them are not to be found in any general dictionary. To the mass of the people this index is practically indispensable for the identification of plants."—*National Nurseryman.*

How to Name the Birds.

By H. E. PARKHURST. 16mo, leather, $1.00 *net.*

"An interesting and useful little book which is designed to enable a bird-lover in the Eastern States to identify any of some three hundred birds that he may see on his rambles. Mr. Parkhurst's grouping of the birds for this purpose is as practical as it is novel. . . . The book can be carried in the pocket, and has a map and three admirable illustrations."—*The Nation.*

By the same Author:

Song Birds and Water Fowl. Illustrated by LOUIS AGASSIZ FUERTES. 12mo, $1.50 *net.*

The Birds' Calendar. Illustrated. 12mo, $1.50 *net.*

Theories of the Will.

By ARCHIBALD ALEXANDER, author of "A Theory of Conduct," "Some Problems of Philosophy," etc. 12mo, $1.50.

Mr. Alexander's new volume gives a concise account of the development of this conception from the earliest days of Greek thought to the middle of the present century. The author's purpose is to introduce in this way a constructive explanation of voluntary action, and this essay is the first of a series in which the subject is thus historically treated.

The Problems of Philosophy.

By JOHN GRIER HIBBEN, Ph. D., Professor of Logic in Princeton University, author of "Inductive Logic." An Introduction to the Study of Philosophy. 12mo, $1.00.

This volume presents a concise and luminous statement of the various points at issue between the several schools of philosophy, and forms a general introduction for beginners in the study. It is designed both for a work of reference and a text-book.

Nature for its Own Sake.

First Studies in Natural Appearances. By JOHN C. VAN DYKE, L. H. D., author of "Art for Art's Sake." With photogravure portrait. 12mo, $1.50.

"No one can read this book without having his knowledge of Nature enlarged, his curiosity quickened, and his sensitiveness to the beauty that is all about him in the world increased and stimulated."—*Chicago Tribune.*

The Discharge of Electricity through Gases.

By J. J. THOMSON, M. A., F. R. S., Cavendish Professor of Physics in the University of Cambridge. 12mo, $1.00 *net.*

Professor Thomson here makes an important contribution to current scientific thought. The author is well known through his writings on abstruse physical science, and the four lectures in this volume, now revised and expanded from the most recent investigations, were delivered at the Princeton Sesqui-centennial Celebration.

Social Elements,

Institutions, Character, Progress. By CHARLES R. HENDERSON, Ph. D., Professor of Sociology in the University of Chicago. 8vo, $1.50 *net.*

"A handbook of sociology intended for the use either of students or the general reader. The book covers the ground pretty thoroughly, touching about every interest and element which go to make up the social structure. The sequence of subjects is well planned, and there is a steady progress from the consideration of lower to higher conditions. The author's style is lucid and simple, and his method of statement clear and forcible. . . . Certainly the book should prove fruitful in suggestion to all who peruse its pages."—*Brooklyn Eagle.*

CHARLES SCRIBNER'S SONS, 153-157 Fifth Ave., New York.

LATEST PUBLICATIONS OF D. APPLETON AND COMPANY.

NEW YORK, OCTOBER, 1898.

The House of Hidden Treasure.

A Novel. By MAXWELL GRAY, author of "The Silence of Dean Maitland," etc. 12mo. Cloth, $1.50.

This novel is regarded by the author as her most important and significant work since "The Silence of Dean Maitland." The scene is laid for the most part in England, and the story opens in the sixties. "There is a strong and prevading charm in this new novel," says the London Chronicle in the course of a long and enthusiastic review of the book, which is characterized as a picture of "a woman's ideal," and free from morbid thoughts and theories. The London Spectator says, "'The Silence of Dean Maitland' was a very popular novel, and we can not see why 'The House of Hidden Treasure' should not rival the success of its forerunner."

David Harum.

A Story of American Life. By EDWARD N. WESTCOTT. 12mo. Cloth, $1.50.

It has been often pointed out that the most successful American novels have been local studies, *genre* pictures of particular types and places, like those of New Orleans by Mr. Cable, of New England by Miss Wilkins and Miss Jewett, of the Northwest by Mr. Hamlin Garland, and of the Southwest by Mr. Owen Wister. Now and then it has happened that a new writer has appeared and gained general recognition by the vividness and force of one local study, like Mr. Howe with "The Story of a Country Town." In the case of "David Harum" the conditions have been similar. The author saturated himself with local atmosphere, and he observed the quaint and delightful type presented in his book until he was able to offer a picture so vivid, true, and irresistibly humorous that we recognize at once the addition of a new figure to the permanent *genre* studies in American fiction. The surroundings of the horse-trading country banker, the reputed Shylock, but real philanthropist, may be taken to be those of a rural district in central New York. The type is so fresh and original that "David Harum" will be appreciated at once by every one who enjoys work which is "racy of the soil" and full of spontaneous humor. The book is a novel, and a love story runs throughout, which is characterized by constantly interesting and sympathetic treatment, but the title rôle is taken by the quaint old banker whose personality will impress every reader. The humor of this striking book is in sharp contrast with the circumstances under which it was written. It was finished while Mr. Westcott lay upon his deathbed, but no trace of his sufferings appears in its pages. Into this book he puts the best results of his keen observations and his most careful work. The results of this generous expenditure of self will be appreciated by his readers.

"A novel which promises to attract special attention not alone for its intrinsic merit, but also on account of the exceptional circumstances under which it was written. . . . The central figure, David Harum, is an old country banker, dry, quaint, and somewhat illiterate. Some of his sayings will undoubtedly challenge comparison with those of Mark Twain's 'Pudd'nhead Wilson,' although the resemblance between the two books ends there. Take, for instance, such sayings as this: 'A reasonable amount of fleas is good for a dog—they keep him f'm broodin' on bein' a dog'; or again, 'Do unto the other feller the way he'd like to do unto yon—an' do it fust.' We predict an unusual success for this volume, and shall have occasion to speak of it later on."—*New York Commercial Advertiser.*

Spanish Literature.

By JAMES FITZ MAURICE-KELLY, Member of the Spanish Academy. A new volume in the Literatures of the World Series, edited by Edmund Gosse. Uniform with "Italian Literature," "Ancient Greek Literature," "French Literature," and "Modern English Literature." 12mo. Cloth, $1.50.

"The introductory chapter has been written to remind readers that the great figures of the silver age—Seneca, Lucan, Martial, Quintilian—were Spaniards as well as Romans. It further aims at tracing the stream of literature from its Roman fount to the channels of the Gothic period; at defining the limits of Arabic and Hebrew influence on Spanish letters; at refuting the theory which assumes the existence of immemorial romances, and at explaining the interaction between Spanish on the one side and Provençal and French on the other. Spain's literature extends over some hundred and fifty years, from the accession of Carlos Quinto to the death of Felipe IV. This period has been treated, as it deserves, at greater length than any other."—*From the Preface.*

The Scientific Memoirs of Thomas Henry Huxley.

Edited by Prof. Michael Foster, M. A., M. D., F. R. S., and by Prof. E. Ray Lankester, M. A., LL. D., F. R. S. In four volumes. Volume I, with 32 plates and a Photogravure Portrait, $7.50 net. (Edition limited to 100 sets.)

"It was a true insight which led Professors Foster and Ray Lankester, the editors of these memoirs, to undertake the work which, begun in this large volume of over six hundred pages, is expected to extend to four volumes in all. No fitter memorial to Huxley could be imagined, no more appropriate attempt to uncover to general view the broad foundations upon which his claim to fame and reputation must rest in the future could be conceived, than to publish in collective form the papers which, for well-nigh half a century of scientific activity, he contributed to scientific societies and scientific periodicals. . . . These memoirs have left us with a very decided impression: we have been introduced, as it were, afresh to Huxley the specialist, Fellow of the Royal Society at twenty-six, its Royal Medallist at twenty-seven, a mind-producing work of the first order, a figure which looms large and impressive on the imagination."—*London Spectator.*

Philip's Experiments; or, Physical Science at Home.

By JOHN TROWBRIDGE, author of "What is Electricity?" Illustrated. 12mo. Cloth.

The writer's object in this book is to show that a little of the time that a youth has outside of the schoolroom may, if devoted to simple investigations under proper guidance, produce important and far-reaching results of permanent educational value. Interest in Nature and science may be aroused in walks with an interesting companion. "Philip's Experiments" will show how much a parent can accomplish in the formation of a son's tastes with a little wisely directed effort.

Our Country's Flag and the Flags of Foreign Countries.

By EDWARD S. HOLDEN. Illustrated. Appletons' Home-Reading Books. 12mo. Cloth.

This book is intended to give the American child a brief history of our national flag and its significance, with some account of the flags of other countries, and of symbols that have had so much to do with the hopes, aspirations, and loyalty of nations. The first part deals with the history of the American flag, and the second part with a short history of flags in general and of the flags of European nations in particular. It is a book that will help the American boy or girl to a higher conception of duty and patriotism.

Historic Boston and its Neighborhood.

By EDWARD EVERETT HALE. Illustrated. Appletons' Home-Reading Books. 12mo. Cloth, 50 cents net.

This little book will serve as a key or as an introduction to the more elaborate guides to historic Boston and its suburbs, and to a general study of the early history of our country, many dramatic events in which occurred in and around this city. Mr. Hale's charming style, pure diction, and power of description, given here in a conversational form, can not fail to make this an entertaining and instructive book for older as well as young readers.

Playtime and Seedtime.

By FRANCIS W. PARKER and NELLIE L. HELM. Illustrated. Appletons' Home-Reading Books. 12mo. Cloth, 32 cents net.

This is the first volume of Uncle Robert's Geography, consisting of six books, graded for school use as well as for the home. Colonel Parker begins his lessons in geography and the phenomena of Nature by relating the experiences of a family of children upon a farm. He gives them free scope to extend their observations and investigations with the aid of their parents and "Uncle Robert," whose visit is described in the third book. Dr. Harris says, "If these books are read by the school children, they will suggest a great variety of ways in which real mental growth and increase of practical power may be obtained."

The Earth and Sky.

By EDWARD S. HOLDEN. Illustrated. Appletons' Home-Reading Books. 12mo. Boards, 28 cents net.

This book is the first of a series of three volumes, treating of the leading phases of astronomical knowledge and designed for use as a reading book in the school as well as in the home. It is written in a simple, conversational style to show first that the earth is not flat, but that it is an immense globe, and next its situation in space. The sun and moon are next treated, and finally the stars in their courses. The young child is shown how he can learn things for himself, and nothing is presented too difficult for him to comprehend.

A Herald of the West.

A Romance of 1812. By J. A. ALTSHELER, author of "A Soldier of Manhattan" and "The Sun of Saratoga." 12mo. Cloth, $1.50.

The author's brilliant success in this country and in England as a writer of American historical romances will direct especial attention to his new book which embodies his most ambitious work. He opens with some most interesting pictures of social life and political conditions in Washington just before the War of 1812, and later the reader gains an insight into the contemporary life of Philadelphia, New York, and Boston. The passages dealing with the war itself include singularly vivid and dramatic accounts of the capture of Washington by the British, and the battle of New Orleans, both noteworthy contributions to American literature. Another feature of the book is the adroit delimination of views between the East and the West of that time, and the characterizations of sentiment in New England. The story moves briskly, and it is told with fine spirit and humor. On the social and political as well as the romantic and military sides this novel will be ranked as an important work of fiction, and a valuable contribution toward a better knowledge of American life in the past.

Of "A Soldier of Manhattan" the London Chronicle says: "Mr. Altsheler sets before us a stirring tale of love and war. . . . He writes in a brisk, straightforward style, eminently suited to the character of the narrator, the historical personages are boldly sketched, and the battle pictures full of life and movement."

The Story of the Mind.

By Prof. JAMES MARK BALDWIN, of Princeton University. Library of Useful Stories. 16mo. Illustrated. Cloth, 40 cents.

"A volume that has long been needed, and the subject has here been treated by a master hand. It is one of the best introductions to the subject of psychology with which we are acquainted. The little volume is not only lucid and forcible elementary study, but the practical lessons it tells or implies are of the utmost value. . . . We strongly recommend the book to serious readers, especially to those who have hitherto avoided books on psychology as being too abstruse and dry."—*Boston Saturday Evening Gazette.*

AUTUMN ANNOUNCEMENTS
1898

D. APPLETON & COMPANY'S

MONTHLY BULLETIN

D. APPLETON & CO.
72 Fifth Avenue, New York

D. Appleton and Company's New Books.

The Scientific Memoirs of Thomas Henry Huxley.

Edited by Prof. MICHAEL FOSTER, M. A., M. D., LL. D., F. R. S., and by Prof. E. RAY LANKESTER, M. A., LL. D., F. R. S. In four volumes. Vol. I, with thirty-two plates and a photogravure portrait. 8vo, cloth, $7.50. (*Edition limited to one hundred sets.*)

"It was a true insight which led Professors Foster and Ray Lankester, the editors of these memoirs, to undertake the work which, begun in this large volume of over six hundred pages, is expected to extend to four volumes in all. No fitter memorial to Huxley could be imagined, no more appropriate attempt to uncover to general view the broad foundations upon which his claim to fame and reputation must rest in the future could be conceived, than to publish in collective form the papers which, for well-nigh half a century of scientific activity, he contributed to scientific societies and scientific periodicals. . . . These memoirs have left us with a very decided impression; we have been introduced, as it were, afresh to Huxley the specialist, Fellow of the Royal Society at twenty-six, its Royal Medallist at twenty-seven, a mind-producing work of the first order, a figure which looms large and impressive on the imagination."—*London Spectator.*

Spanish Literature.

By JAMES FITZ MAURICE-KELLY, Member of the Spanish Academy. A new volume in the Literatures of the World Series, edited by Edmund Gosse. Uniform with "Ancient Greek Literature," "French Literature," "Modern English Literature," and "Italian Literature." 12mo, cloth, $1.50.

"The introductory chapter has been written to remind readers that the great figures of the silver age—Seneca, Lucan, Martial, Quintilian—were Spaniards as well as Romans. It further aims at tracing the stream of literature from its Roman fount to the channels of the Gothic period; at defining the limits of Arabic and Hebrew influence on Spanish letters; at refuting the theory which assumes the existence of immemorial romances, and at explaining the interaction between Spanish on the one side, and Provençal and French on the other. Spain's literature extends over some hundred and fifty years, from the accession of Carlos Quinto to the death of Felipe IV. This period has been treated as it deserves, at greater length than any other."—*From the Preface.*

The Play of Animals.

By KARL GROOS, Professor of Philosophy in the University of Basel. Translated, with the Author's co-operation, by Elizabeth L. Baldwin. With a Preface and an Appendix by J. Mark Baldwin. 12mo, cloth, $1.75.

"The book is a treasure house of the most amusing and interesting stories about the entire brute creation, from elephants to ants, all adduced as illustrating some mental process. We feel that we are brought into closer contact with and a better understanding of those faithful friends from whom we learn so much."—*Boston Beacon.*

Studies of Good and Evil.

By JOSIAH ROYCE, Professor of the History of Philosophy in Harvard University. 12mo, cloth, $1.50.

"Professor Royce is well known as one of the ablest writers on philosophical and ethical subjects in the country, and what he says on these themes is always worthy of attention."—*Brooklyn Eagle.*

"To any one at all interested in the deeper intellectual problems of the times, these essays by Professor Royce will open lines of thought that tend inevitably to a broadened mental horizon."—*Boston Beacon.*

Outlines of the Earth's History. A Popular Study in Physiography.

By Prof. N. S. SHALER, of Harvard University. Illustrated. 12mo, cloth, $1.75.

"Any one who reads the preliminary chapters will not stop until he has read the entire book. The subject is certainly one of supreme interest, and it would be hard to find any one more competent to write about it than Professor Shaler."—*New York Herald.*

Political Crime.

By LOUIS PROAL. With an Introduction by Prof. F. H. Giddings, of Columbia University. A new volume in the Criminology Series, edited by W. Douglas Morrison. 12mo, cloth, $1.50.

"With the spirit of his work it is impossible to disagree. M. Proal's aim is to show that the successes of political immorality are fleeting. . . . that principle is superior to expediency, that audacity is dangerous, . . . that unprincipled politics are pagan politics and detrimental to the progress of society, that a return to principles and moral beliefs and the substitution of ideas for appetites are the true remedy of that hideous malady—political corruption. . . . A careful reading leaves the reader convinced of the truth of the proposition that the only successful policy in the art of government is a moral policy."—*Independent.*

Appletons' Monthly Bulletin.

MESSRS. D. APPLETON AND COMPANY'S preliminary autumn announcements include the following books:

STANDARD AND MISCELLANEOUS.

Recollections of the Civil War, by Charles A. Dana, with portrait.

The Scientific Memoirs of Thomas Henry Huxley, edited by Prof. Michael Foster and Prof. E. Ray Lankester, in four volumes (Vol. I, with 32 plates and photogravure portrait).

Spanish Literature, by J. Fitz Maurice-Kelly, a new volume in the Literatures of the World Series, edited by Edmund Gosse.

Admiral Porter, by James Russell Soley, formerly Assistant Secretary of the United States Navy, a new volume in the Great Commanders Series, edited by General James Grant Wilson.

The Story of the Railroad, by Cy Warman, illustrated by B. West Clinedinst and others, a new volume in the Story of the West Series, edited by Ripley Hitchcock.

Cannon and Camera; Sea and Land Battles of the Spanish-American war in Cuba; camp life, and the return of the soldiers; described and illustrated by John C. Hemment, war artist at the front.

Puerto Rico, an illustrated handbook for travelers, investors, and others, by Frederick A. Ober.

The History of the World, a new volume in the Concise Knowledge Library, illustrated.

Stories of our Navy in Time of War, by Franklin Matthews.

History of Spain, by Frederick A. Ober, a new volume in the History for Young Readers Series.

Philip's Experiments, or Physical Science at Home, by Prof. John Trowbridge, of Harvard University.

In Appletons' Home-Reading Series:

Historic Boston and its Neighborhood, an historical pilgrimage personally conducted by Dr. Edward Everett Hale, illustrated.

Our Nation's Flag and Other Flags, by Edward S. Holden, illustrated.

Playtime and Seedtime, by Francis W. Parker and Nellie L. Helm.

The Earth and Sky, by Edward S. Holden.

FICTION.

Latitude 19°, a romance of the West Indies, by Mrs. Schuyler Crowninshield, illustrated.

The House of Hidden Treasure, by Maxwell Gray.

Her Memory, by Maarten Maartens.

The Phantom Army, by Max Pemberton.

David Harum, a story of American life, by Edward Noyes Westcott.

A Herald of the West, a romance of 1812, by J. A. Altsheler.

Concerning Isabel Carnaby, by Ellen Thorneycroft Fowler.

The Gospel Writ in Steel, a story of the American civil war, by Arthur Paterson.

The Lust of Hate, by Guy Boothby.

The Widower, by W. E. Norris.

The Scourge of God, by J. Bloundelle-Burton.

The Knight of the Golden Chain, by R. D. Chetwode.

The Impediment, by Dorothea Gerard.

ILLUSTRATED JUVENILE BOOKS.

The Hero of Erie (Commodore Perry), by James Barnes, a new volume in the Young Heroes of our Navy Series.

With the Black Prince, by William O. Stoddard.

The Pilot of the Mayflower, by Hezekiah Butterworth.

Success against Odds, by William O. Stoddard.

Bible Stories in Bible Language, by Edward Tuckerman Potter, new edition, with an introduction by the Right Rev. Henry C. Potter, Bishop of New York.

* * *

The late Charles A. Dana's *Recollections of the Civil War* form one of the most remarkable volumes of historical, political, and personal reminiscences which have been given to the public. Mr. Dana begins with his association with Horace Greeley, and his change from the *Tribune* to the War Depart-

CHARLES A. DANA.

ment in which he became Mr. Stanton's assistant and close associate. Mr. Dana's intimate relations to the great events of the war, in the field and at Washington, and his connection with President Lincoln and with the leading figures in military, political, and business circles, have enabled him to depict the inner life of that period in a manner which has not been approached. Mr. Dana was not only practically a member of the Cabinet and in the confidence of leaders at Washington, but he was also the chosen representative of the War Department with General Grant and other military commanders, and he was present at many of the councils which preceded movements of the greatest importance. Mr. Dana was selected to sit in judgment upon charges of treason, bribery, and fraud, and he was familiar with all the inner workings of the vast machinery which was set in operation by the war. The importance of this unwritten history is obvious. Furthermore, Mr. Dana's own narrative is reenforced by many letters from Grant, Stanton, Sherman, and others, now published in book form for the first time. It is unnecessary to add any reference to Mr. Dana's mastery of English. When these reminiscences were published in part in McClure's Magazine they were characterized as "not only the most important piece of historical writing of the latter end of the century as to fact and material, but in style and presentation they belong to our enduring literature."

* * *

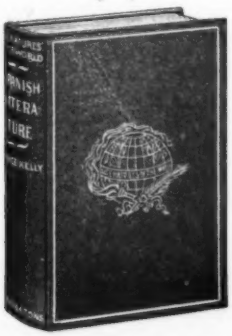
The scope and consequence of Huxley's *Scientific Memoirs* are indicated by the following account:

"Professor Huxley's great ability as a popular writer and controversialist, which gave him his reputation with the general reader, has somewhat obscured the important work he did in the field of original research. Quite apart from the influence he exerted as a public teacher was his work in technical biology, and the progress in this science during the present century has been largely due to labors of his of which the public knows nothing. These volumes, jointly edited by the foremost physiologist and the leading zoölogist of England, are intended to place his more strictly scientific work within reach of the student. It is thought that, aside from the value of these papers as furnishing in a compact form his biological researches, and as offering in conjunction with his other books a complete collection of his writings, they will prove an important reference library for the younger biologists. They are very readable, and many of them announce important biological discoveries. Besides giving a fairly connected history of nineteenth-century biology, they are well calculated to inspire the student to new efforts toward advancing his science, and to keep ever before his mind the most essential quality of the scientist, which Professor Huxley so constantly insisted on—namely, an unwavering search for and acceptance, when found, of the truth. The papers are

THOMAS H. HUXLEY.

arranged in chronological order, the present volume containing the first fifty, originally published between 1847 and 1860, a period which covered Huxley's complete transition from a medical student to a leading European authority on zoölogical science. The two most important events of his life during this period were his voyage as surgeon on the Rattlesnake, and his subsequent abandonment of the medical profession for purely scientific work. The most obvious feature of the memoirs is the wide range of subjects dealt with. There is hardly a group of the animal kingdom, hardly a department of biological science, to which some contribution is not made. In vertebrate anatomy there is the great lecture on The Theory of the Vertebrate Skull, and special studies of fossil reptiles and fishes. The group of creatures now known to form a connecting link between vertebrates and invertebrates—amphioxus and its allies the sea squirts and salps—are discussed in a number of papers. The great invertebrate groups are also largely represented. The more philosophical biological problems, questions having to do with generation and individuality in the lower forms of life, and the special bearing of these on the general theory of evolution, are the subjects of many of the researches. One of the most important of the memoirs is that which discusses the cell theory and the vital identity of plants and animals. It is one of the earliest detailed presentations of the view, now so generally accepted, of the essential unity of the whole realm of life."

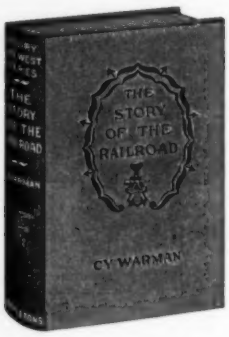
* * *



In his preface to *Spanish Literature*, the new volume in the Literatures of the World Series, edited by Mr. Edmund Gosse, the author, Dr. J. Fitz Maurice-Kelly, says: "The introductory chapter has been written to remind readers that the great figures of the silver age—Seneca, Lucan, Martial, Quintilian—were Spaniards as well as Romans. It further aims at tracing the stream of literature from its Roman fount to the channels of the Gothic period; at defining the limits of Arabic and Hebrew influence on Spanish letters; at refuting the theory which assumes the existence of immemorial *romances*, and at explaining the interaction between Spanish on the one side and Provençal and French on the other. It has been thought that this treatment saves much digression. Spanish literature, like our own, takes its root in French and in Italian soil; in the anonymous epics, in the *fableaux*, as in Dante, Petrarch, and the Cinque Cento poets. Excessive patriotism leads men of all lands to magnify their literary history; yet it may be claimed for Spain, as for England, that she has used her models without compromising her originality, absorbing here, annexing there, and finally dominating her first masters. But Spain's victorious course, splendid as it was in letters, arts, and arms, was comparatively brief. The heroic age of her literature extends over some hundred and fifty years, from the accession of Carlos Quinto to the death of Felipe IV. This period has been treated, as it deserves, at greater length than any other."

* * *

The Story of the Railroad, which follows "The Story of the Cowboy" in the Story of the West Series, pictures the building of the earlier transcontinental lines across the true West. It tells the story of the engineer who found the way, and who was the pioneer of permanent civilization among the Indians and buffalo of the plains and in the mountains. Historically the book is

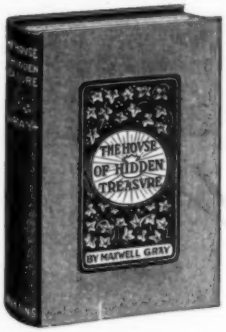


valuable because it gives a comprehensive sketch of a great subject in a brief compass, and, furthermore, the strange and picturesque phases of life which are depicted are full of immediate interest. An actual war, now forgotten, for the possession of a cañon in Colorado is vividly described by Mr. Warman, who has shared in the work of railroad men in the West, and who made a special journey through the West to gather fresh material for this valuable and entertaining book.

In connection with *The Story of the Railroad* it is pertinent to quote the following from "Across the Plains," by Robert Louis Stevenson:

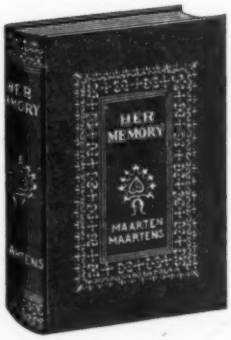
"When I think how the railroad has been pushed through this unwatered wilderness and haunt of savage tribes; how, at each stage of the construction, roaring, impromptu cities full of gold and lust and death sprang up and then died away again, and are now but wayside stations in the desert; how in these uncouth places pigtailed pirates worked side by side with border ruffians and broken men from Europe, talking together in a mixed dialect, mostly oaths, gambling, drinking, quarreling, and murdering like wolves; how the plumed hereditary lord of all America heard in this last fastness the scream of the 'Bad Medicine Wagon' charioting his foes; and then when I go on to remember that all this epical turmoil was conducted by gentlemen in frock coats, and with a view to nothing more extraordinary than a fortune and a subsequent visit to Paris, it seems to me, I own, as if this railroad were the one typical achievement of the age in which we live; as if it brought together into one plot all the ends of the world and all the degrees of social rank, and offered the busiest, the most extended, and the most varying subject for an enduring literary work. If it be romance, if it be contrast, if it be heroism that we require, what was Troy town to this?"

* * *



The House of Hidden Treasure is regarded by Maxwell Gray (Miss M. G. Tuttiett) as her most important and significant work since "The Silence of Dean Maitland." The scene is laid for the most part in England, and the story opens in the sixties. "There is a strong and pervading charm in this new novel," says the London Chronicle in the course of a long and enthusiastic review of the book, which is characterized as a picture of "a woman's ideal," and free from morbid thoughts and theories. The London Spectator says: "'The Silence of Dean Maitland' was a very popular novel, and we can not see why *The House of Hidden Treasure* should not rival the success of its forerunner."

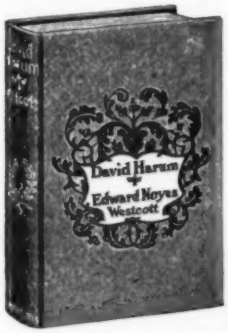
* * *



Her Memory, by Maarten Maartens, author of "God's Fool," a delicate and

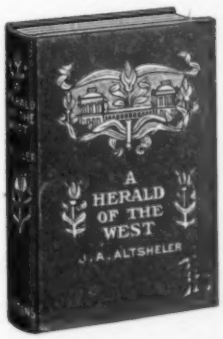
sympathetic character study, wherein this fine literary artist has departed from the environments of Holland, and Mr. Pemberton's stirring adventure story, *The Phantom Army*, which seems to have been suggested by some phases of Carlist risings in Spain, are novels which will be awaited with especial interest. Each book in its field is a work of much distinction.

* * *



American readers of native fiction will be prompt to recognize the originality and striking merit of the new author, Edward Noyes Westcott, whose novel *David Harum*, a story of American life, is to be published shortly by D. Appleton and Company. It has been often pointed out that the most successful American novels have been local studies, *genre* pictures of particular types and places, like those of New Orleans by Mr. Cable, of New England by Miss Wilkins and Miss Jewett, of the Northwest by Mr. Hamlin Garland, and of the Southwest by Mr. Owen Wister. Now and then it has happened that a new writer has appeared and gained general recognition by the vividness and force of one local study, like Mr. Howe with "The Story of a Country Town." In the case of *David Harum* the conditions are identical. The author saturated himself with local atmosphere, and he observed the quaint and delightful type presented in his book until he was able to offer a picture so vivid, true, and irresistibly humorous that we recognize at once the addition of a new figure to the permanent *genre* studies in American fiction. The surroundings of the horse-trading country banker, the reputed Shylock, but real philanthropist, may be taken to be those of a rural district in central New York. The type is so fresh and original that *David Harum* will be appreciated at once by every one who enjoys work which is "racy of the soil" and full of spontaneous humor. The book is a novel, and a love story runs throughout which is characterized by constantly interesting and sympathetic treatment, but the title rôle is taken by the quaint old banker, whose personality will impress every reader. The humor of this striking book is in sharp contrast with the circumstances under which it is written. It was finished while Mr. Westcott lay upon his deathbed, but no trace of his sufferings appears in its pages. Into this book he put the best results of his keen observations and his most careful work.

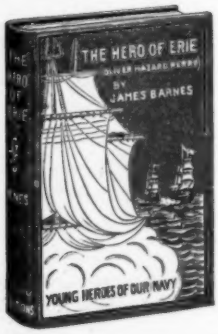
* * *



One of the noteworthy features of Mr. J. A. Altsheler's success as a writer of American historical romances has been the cordial reception given by English critics to his *Soldier of Manhattan*, a story which gave an American colonist's impression of English arrogance and stupidity before the Revolution. The spirit and quality of Mr. Altsheler's work were as warmly praised in England as in this country. The author has been engaged for some time

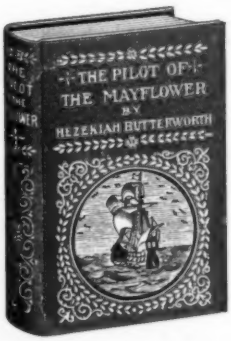
upon his most serious and important work in fiction, *A Herald of the West*, an American romance of 1811–1815, which will be published this autumn. The author's brilliant success in this country and in England as a writer of American historical romances will direct especial attention to his new book, which embodies his most ambitious work. He opens with some most interesting pictures of social life and political conditions in Washington just before the War of 1812, and later the reader gains an insight into the contemporary life of Philadelphia, New York, and Boston. The passages dealing with the war itself include singularly vivid and dramatic accounts of the capture of Washington by the British, and the battle of New Orleans, both noteworthy contributions to American literature. Another feature of the book is the adroit delimitation of views between the East and the West of that time, and the characterizations of sentiment in New England. The story moves briskly, and it is told with fine spirit and humor. On the social and political as well as the romantic and military sides this novel will be ranked as an important work of fiction, and a valuable contribution toward a better knowledge of American life in the past.

* * *



The theme of Mr. James Barnes's new book in the Young Heroes of Our Navy Series is *The Hero of Erie* (Oliver Hazard Perry). In this graphic and spirited story Mr. Barnes tells of Perry's adventures as a boy on the frigate General Greene, and conducts his hero through the exciting scenes which attended the battle of Lake Erie. It is a story which illustrates the resourcefulness, energy, and dauntless courage which have characterized our naval heroes from Paul Jones to Dewey and Hobson. The book is an important addition to a series which is indispensable for American youth who wish to know the historic deeds of our navy, and at the present time the Young Heroes of our Navy Series is of peculiar interest to older readers.

* * *



The Pilot of the Mayflower, Mr. Hezekiah Butterworth's new book, is likely to prove one of the most successful of his popular American historical stories for young readers. Mr. Butterworth pictures the scenes preceding the sailing of the Pilgrims and attending the voyage, and he describes the early days at Plymouth. All this is done in a story whose thread is maintained consistently throughout. He has dramatized, as it were, one of the most important pages of our history, and the vividness of his characterizations brings the scenes actually before his readers. The book is of great value historically, and the unflagging interest of the story adds another book of peculiar merit to Mr. Butterworth's American historical stories, the Creators of Liberty Series, published by D. Appleton and Company.

The illustrations include views of Plymouth Rock and other actual scenes at Plymouth, together with pictures which aim to reproduce the first settlement.

***

The subtitle of Mr. W. O. Stoddard's new book, *Success against Odds*, is *How an American Boy made his Way*. In this spirited and interesting story the author tells the adventures of a plucky boy who fought his own battles and made his own way upward from poverty in a Long Island seashore town. It is a tale of pluck and self-reliance capitally told. The seashore life is vividly described, and there are plenty of exciting incidents. Mr. B. West Clinedinst has furnished some excellent illustrations.

***

Mr. Stoddard's forthcoming historical story for young readers, *With the Black Prince*, is a stirring tale of adventure and of battle, but it is also an informing presentation of life in England and some phases of life in France in the fourteenth century. The hero fights with the Black Prince at Crécy and elsewhere. Mr. Stoddard has done his best work in this story, and the absorbing interest of his stirring historical romance will appeal to all young readers.

***

The new edition of *Bible Stories in Bible Language*, by Edward Tuckerman Potter, which is to be published by D. Appleton and Company this autumn, with new illustrations, has an introduction by the Right Rev. Henry C. Potter, Bishop of New York, who says in closing: "Since this is a volume which aims to gather these Bible stories and to set them in their familiar language in clear and consecutive form, it can not but serve a good use and find a wide welcome. The earlier edition of this volume has received such a welcome; and now that it is asked for again, I am sure that many readers and hearers, both old and young, will be glad to possess it."

***

Dr. Georg Ebers, Egyptologist and novelist, died at the Villa Ebers, in Tutzing, near Munich, on August 7th. Dr. Ebers was born in Berlin, on March 1, 1837. The house in which his mother dwelt was the home of the brothers Grimm, whose influence undoubtedly made a great impression upon the future student and author. His romances, biographies, and autobiography are published by D. Appleton and Company.

DR. GEORG EBERS.

APPLETONS' HOME-READING BOOKS.

The announcement of Appletons' Home-Reading Books in the early part of last year created at once among teachers and parents universal interest, and elicited numerous expressions of unqualified approval. The marked success of the series has fully justified the publishers in the project in all respects. The purpose of the Home-Reading Books is to provide wholesome, instructive, and entertaining reading for young people during the early educative period, and more especially through such means to bring the home and the school into closer relations and into more thorough co-operation. The plan of these books covers the entire field of school study, and supplements every kind and grade of class-room work. At the same time they furnish a great variety of recreative reading for the home, stimulating a desire in the young pupil for further knowledge and research, and cultivating a taste for good literature that will be of permanent benefit to him. The importance of the undertaking as an educational movement was at once appreciated by Dr. William T. Harris, the United States Commissioner of Education, and he consented to take the editorial charge of the books proposed for this series. The series is classed in four divisions. The first comprises natural history, including popular treatises on plants and animals, and also descriptions of geographical localities, all of which pertain to the study of geography in the common schools. Descriptive astronomy and anything that relates to organic Nature comes under this head. The second includes whatever relates to natural philosophy, statics, dynamics, properties of matter, and chemistry, organic and inorganic. The third covers history, biography, ethnology, ethics, civics, and all that relates to the lives of individuals or of nations; and the fourth, works of general literature that portray human nature in the form of feelings, emotions, and the various expressions of art and music. Published under such able supervision, they may be accepted as possessing unquestionable merit and usefulness. Many of the volumes—notably those comprising Nature Study Readers, by J. W. Troeger, and Uncle Robert's Geography, by Colonel F. W. Parker—are especially valuable for supplementary reading in schools, and are already in extensive use with satisfactory results. More than twenty volumes of the Home-Reading Books have already been published, and others will rapidly follow. Those to be issued during the autumn are: *Historic Boston and its Neighborhood*, an historical pilgrimage personally conducted by Dr. Edward Everett Hale, illustrated; *Playtime and Seedtime*, by Francis W. Parker and Nellie L. Helm (Uncle Robert's Geography, Part I); *Harold's Experiments*, by J. W. Troeger, Nature Study Readers, No. 3; *The Story of the Fishes*, by James Newton Baskett; *The Earth and Sky*, by E. S. Holden; *The Sun and his Family*, by E. S. Holden; *Some Great Astronomers*, by E. S. Holden; *About the Weather*, by Mark W. Harrington; and *Stories from the Arabian Nights*, by E. S. Holden.

INTERNATIONAL EDUCATION SERIES.

Forty-three volumes of this standard pedagogical series have now been published. Others to be issued during the year are: *Education by Development*, by Friedrich Froebel; the second and concluding part of *Pedagogics of the Kindergarten*, translated by Josephine Jarvis; *Systematic Science Teaching*, Part II, by Edward G. Howe. A part of this series is now published in special binding and designated as The Teachers' Practical Library. It comprises twelve of the most practical books of the series, with a complete syllabus, and is of special value to the younger teachers and those preparing to teach.

Appletons' Home-Reading Books.

Our Country's Flag and the Flags of Foreign Countries.
By EDWARD S. HOLDEN. Illustrated. 12mo. Cloth.

Historic Boston and its Neighborhood.
An Historical Pilgrimage Personally Conducted by Dr. EDWARD EVERETT HALE. Illustrated. 12mo. Cloth, 50 cents net.

The Earth and Sky.
By EDWARD S. HOLDEN. 12mo. Boards, 28 cents net.

This book is the first of a series of three volumes treating of the leading phases of astronomical knowledge, and designed for use as a reading book in the school as well as in the home. It is written in a simple, conversational style, to show first that the earth is not flat, but that it is an immense globe, and next its situation in space. The sun and moon are next treated, and finally the stars in their courses. The young child is shown how he can learn things for himself, and nothing is presented too difficult for him to comprehend.

Playtime and Seedtime.
By FRANCIS W. PARKER and NELLIE L. HELM. Illustrated. 12mo. Cloth, 32 cents net.

Philip's Experiments; or, Physical Science at Home.
By JOHN TROWBRIDGE, S. D., Rumford Professor and Lecturer on the Applications of Science to the Useful Arts, Harvard University; Author of "What is Electricity?" etc. Illustrated. 12mo. Cloth, $1.00.

BY THE LATE GEORG EBERS.

Arachne. An Egyptian Romance.
By Dr. GEORG EBERS, author of "Uarda," "Joshua," "An Egyptian Princess," etc. Uniform edition. In 2 volumes. 16mo. Per volume, cloth, 75 cents; paper, 40 cents.

"It is too late in the day to add anything new to what has already been written with reference to Ebers's remarkable grasp of detail and 'atmosphere.' Let it suffice to say that this quality nowhere in his works has greater evidence than in this stirring tale. An Egyptologist would find few flaws with which to quarrel. 'Arachne' is of absorbing interest, and will be widely read."—*San Francisco Call.*

DR. EBERS'S OTHER BOOKS.

Each, 16mo, cloth, 75 cents per volume; paper, 40 cents.

Barbara Blomberg. Translated by MARY J. SAFFORD. 2 volumes.

In the Blue Pike. Translated by MARY J. SAFFORD. 1 volume.

In the Fire of the Forge. Translated by MARY J. SAFFORD. 2 volumes.

Cleopatra. Translated by MARY J. SAFFORD. 2 volumes.

A Thorny Path. (Per Aspera.) Translated by CLARA BELL. 2 volumes.

An Egyptian Princess. Translated by ELEANOR GROVE. 2 volumes.

Uarda. Translated by CLARA BELL. 2 vols.

Homo Sum. Translated by CLARA BELL. 1 volume.

The Sisters. Translated by CLARA BELL. 1 volume.

A Question. Translated by MARY J. SAFFORD. 1 volume.

The Emperor. Translated by CLARA BELL. 2 volumes.

The Burgomaster's Wife. Translated by MARY J. SAFFORD. 1 volume.

A Word, only a Word. Translated by MARY J. SAFFORD. 1 volume.

Serapis. Translated by CLARA BELL. 1 volume.

The Bride of the Nile. Translated by CLARA BELL. 2 volumes

Margery. (Gred.) Translated by CLARA BELL. 2 volumes.

Joshua. Translated by MARY J. SAFFORD. 1 volume.

The Elixir, and Other Tales. Translated by Mrs. EDWARD H. BELL. With Portrait of the Author. 1 volume.

Lorenz Alma Tadema: His Life and Works. Translated by MARY J. SAFFORD. 1 volume.

Richard Lepsius: A Biography. Translated by ZOE DANA UNDERHILL. 1 volume.

ALSO, **The Story of my Life.** Translated by MARY J. SAFFORD. With Portraits. 12mo. Cloth, $1.25.

NEW AMERICAN NOVELS.

David Harum.

A Story of American Life. By EDWARD NOYES WESTCOTT. 12mo. Cloth, $1.50.

It has been often pointed out that the most successful American novels have been local studies, *genre* pictures of particular types and places, like those of New Orleans by Mr. Cable, of New England by Miss Wilkins and Miss Jewett, of the Northwest by Mr. Hamlin Garland, and the Southwest by Mr. Owen Wister. Now and then it has happened that a new writer has appeared and gained general recognition by the vividness and force of one local study, like Mr. Howe with "The Story of a Country Town." In the case of "David Harum" the conditions have been similar. The author saturated himself with local atmosphere, and he observed the quaint and delightful type presented in his book until he was able to offer a picture so vivid, true, and irresistibly humorous that we recognize at once the addition of a new figure to the permanent *genre* studies in American fiction.

"The main character ought to become familiar to thousands of readers, and will probably take his place in time beside Joel Chandler Harris's and Thomas Nelson Page's and Miss Wilkins's creations."—*Chicago Times-Herald.*

A Herald of the West.

A Romance of 1812. By J. A. ALTSHELER, author of "A Soldier of Manhattan" and "The Sun of Saratoga." 12mo. Cloth, $1.50.

The author's brilliant success in this country and in England as a writer of American historical romances will direct especial attention to his new book, which embodies his most ambitious work. He opens with some most interesting pictures of social life and political conditions in Washington just before the War of 1812, and later the reader gains an insight into the contemporary life of Philadelphia, New York, and Boston. The passages dealing with the war itself include singularly vivid and dramatic accounts of the capture of Washington by the British, and the battle of New Orleans, both noteworthy contributions to American literature. Another feature of the book is the adroit delimitation of views between the East and the West of that time, and the characterizations of sentiment in New England. The story moves briskly, and it is told with fine spirit and humor. On the social and political as well as the romantic and military sides this novel will be ranked as an important work of fiction, and a valuable contribution toward a better knowledge of American life in the past.

Her Memory.

(*Ready shortly.*) By MAARTEN MAARTENS, author of "God's Fool," "The Greater Glory," "Joost Avelingh," etc. Uniform edition. With photogravure Portrait. 12mo. Cloth, $1.50.

After Maarten Maartens's long silence, this new example of his fine literary art will be received with peculiar interest. He offers in this book a singularly delicate and sympathetic study of character.

"Maarten Maartens took us all by storm some time ago with his fine story christened 'God's Fool.' He established himself at once in our affections as a unique creature who had something to say and knew how to say it in the most fascinating way. He is a serious story writer, who sprang into prominence when he first put pen to paper, and has ever since kept his work up to the standard of excellence which he raised in the beginning."—*New York Herald.*

MAXWELL GRAY'S NEW NOVEL.

The House of Hidden Treasure.

A Novel. By MAXWELL GRAY, author of "The Silence of Dean Maitland," etc. 12mo. Cloth, $1.50.

This novel is regarded by the author as her most important and significant work since "The Silence of Dean Maitland." The scene is laid for the most part in England, and the story opens in the '60s. "There is a strong and pervading charm in this new novel," says the London Chronicle in the course of a long and enthusiastic review of the book, which is characterized as a picture of "a woman's ideal," and free from morbid thoughts and theories.

The London Spectator says, "'The Silence of Dean Maitland' was a very popular novel, and we can not see why 'The House of Hidden Treasure' should not rival the success of its forerunner."

NEW NOVELS IN APPLETONS' TOWN AND COUNTRY LIBRARY.

No. 250. *THE WIDOWER.* By W. E. NORRIS, author of "Marietta's Marriage," "The Dancer in Yellow," "A Victim of Good Luck," etc.

No. 251. *THE SCOURGE OF GOD.* By J. BLOUNDELLE-BURTON, author of "The Clash of Arms," "In the Day of Adversity," "Denounced," etc.

D. APPLETON AND COMPANY, Publishers, 72 Fifth Avenue, New York.

News from the Birds.

By LEANDER S. KEYSER. Appletons' Home-Reading Books. 12mo. Cloth, 60 cents net.

This little book of tidings from birdland has been written with two purposes in mind. The first is, to furnish actual instruction, to tell some new facts about bird life that have not yet been recited—that is, in short, to give a little bird "news." The second purpose of the book is inspiration. It is not intended for a key. Instead of telling all that is or may be known about a particular bird, only such incidents are recited as will spur the reader to go out into the fields and woods and study the birds in their native haunts.

Harold's Rambles.

By J. W. TROEGER. (Second volume of Nature Study Readers.) Appletons' Home-Reading Books. 40 cents net.

This book contains in most part a record of the observations of a child with his elder companions, and contains information gleaned during walks and short excursions into the fields and along the roadsides. The constant aim has been not to weary the child with details, but to give such information as will lead to accurate and more extended observations.

The Story of Rob Roy.

By Sir WALTER SCOTT, Bart., condensed for home and school reading by Edith D. Harris. Appletons' Home-Reading Books. 60 cents net.

In this abridgment all lengthy descriptions of scenery, historical disquisitions on the times, and a few passages of dialogue and monologue that do not interrupt the continuity of the narrative, have been omitted. Otherwise the original text is retained.

The Play of Animals.

By KARL GROOS, Professor of Philosophy in the University of Basel. Translated, with the Author's co-operation, by Elizabeth L. Baldwin. With a Preface and an Appendix by J. Mark Baldwin. 12mo. Cloth, $1.75.

"The book is a treasure-house of the most amusing and interesting stories about the entire brute creation, from elephants to ants, all adduced as illustrating some mental process. We feel that we are brought into closer contact with and a better understanding of those faithful friends from whom we learn so much."—*Boston Beacon.*

The Terror.

A Romance of the French Revolution. By FÉLIX GRAS. Translated by Mrs. Catharine A. Janvier. 16mo. Cloth, $1.50.

"If Félix Gras had never done any other work than this novel it would at once give him a place in the front rank of the writers of to-day. Mrs. Janvier has performed her work with that fidelity which springs from a keen interest in and appreciation of the literary quality of the author's work. The English version bears every evidence of the touch of a sympathetic hand. . . . 'The Terror' is a story that deserves to be widely read, for, while it is of thrilling interest, holding the reader's attention closely, there is about it a literary quality that makes it worthy of something more than a careless perusal."—*Brooklyn Eagle.*

Familiar Life in Field and Forest.

By F. SCHUYLER MATHEWS. Uniform with "Familiar Flowers," "Familiar Trees," and "Familiar Features of the Roadside." With many Illustrations. 12mo. Cloth, $1.75.

"Intended to assist the observer to become acquainted with his woodland neighbors, to recognize the different species, and to learn something of their ways. For this it is well adapted, and we think would prove a welcome guide to many an intelligent boy or girl on a summer outing. . . . The publishers have done their part in making the volume attractive."—*New York Evening Post.*

"This book is a charming companion to take on a summer vacation. . . . It is written in the simplest of language, and would prove a valuable aid to any teacher of natural history."—*Washington Times.*

A History of the United States Navy,

From 1775 to 1898. By EDGAR STANTON MACLAY, A. M. With Technical Revision by Lieutenant Roy C. Smith, U. S. N. New edition, revised and enlarged, with new chapters and several new illustrations. In two volumes. 8vo. Per vol., cloth, $3.50.

"The author writes as one who has digged deep before he began to write at all. He thus appears as a master of his material. This book inspires immediate confidence as well as interest."—*New York Times.*

"Mr. Maclay is specially qualified for the work he has undertaken. Nine years has he devoted to the task. The result of his labors possesses not only readableness but authority. . . . Mr. Maclay's story may be truthfully characterized as a thrilling romance, which will interest every mind that is fed by tales of heroism, and will be read with patriotic pride by every true American."—*Chicago Evening Post.*

"It fills a place which has almost escaped the attention of historians Mr. Maclay's work shows on every page the minute care with which he worked up his theme. His style is precise and clear, and without any pretense of rhetorical embellishment."—*New York Tribune.*

"It has been accepted as a standard authority, and its adoption as a text-book at Annapolis is a sufficient testimony of its technical merit."—*Philadelphia Press.*

LATEST ISSUES IN

Appletons' Town and Country Library.

Each, 12mo, paper, 50 cents; cloth, $1.00.

"The beauty of Appletons' Town and Country Library series is that one is always sure of being thoroughly entertained, no matter how much at random he may make his selection or what season of the year it may happen to be."—*Boston Herald.*

No. 250. The Widower.

By W. E. NORRIS, author of "Marietta's Marriage," "The Dancer in Yellow," "A Victim of Good Luck," etc.

This is one of the adroitly executed pictures of social life which Mr. Norris's practiced hand invests with so much interest. The experienced novel-reader is always grateful to Mr. Norris for the smooth flow of his narrative and the skillful development of his characters and situations, and this new story will be found to be an excellent example of the author's agreeable work.

No. 249. The Gospel Writ in Steel.

By ARTHUR PATERSON.

Mr. Paterson's story begins with the effect of the opening of the civil war upon a village community, and pictures the motives and acts of the volunteers, their methods of organization, and other features of preparation. A graphic account of Bull Run follows, and later the hero undergoes some remarkable adventures in the course of Sherman's March to the Sea. The book abounds in stirring experiences, and the love-story which runs throughout has an unusual and piquant interest. At this time Mr. Paterson's novel will be certain to attract exceptional attention.

No. 248. The Lust of Hate.

By GUY BOOTHBY, author of "A Bid for Fortune," "The Marriage of Esther," "Dr. Nikola," etc.

Mr. Boothby is at his best in this romance, which is characterized by unflagging interest and by most stirring adventures in which Dr. Nikola plays a leading part. *The Scotsman* says: "Intensely interesting. . . . Mr. Boothby in 'The Lust of Hate' has recreated his famous Dr. Nikola. . . . A story of such exciting incident that the reader recovers breath only when the hero is well away from the shores of England. With artistic realism he describes the thrilling and romantic incidents, and gives free scope to his powerful descriptive pen. . . . Fairly captivates the reader."

No. 247. Dicky Monteith.

A Love Story. By T. GALLON, author of "Tatterley" and "A Prince of Mischance."

"A novel to be valued for its tender sentiment, its gentle humor, its pleasant and invigorating story, and in particular for the wholesome view it furnishes of life. It should be assured a popularity even greater than that enjoyed by 'Tatterley.'"—*St. James Gazette.*

No. 246. The Queen's Cup.

A Novel. By G. A. HENTY, author of "The Henty Books."

"One of the characteristic Henty novels, full of dash and vigor. . . . The interest in the story is kept up throughout, and the book is an excellent one to include in a summer library."—*Washington Times.*

No. 245. The Looms of Time.

A Novel. By Mrs. HUGH FRASER, author of "Palladia," etc.

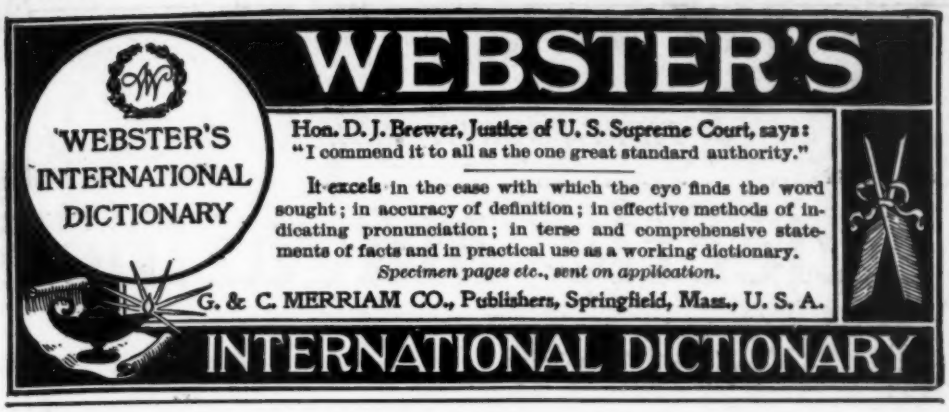
"A splendid example of what a good tale for summer reading ought to be. It tells a pretty love story. It has dainty and quotable bits of description here and there along its pages; it is chock full of the sort of adventure that thrills one with a decorous and stimulating sort of a thrill, and it is well and spiritedly written. . . . It can be commended as a clean, wholesome, fascinating bit of fiction, written in a free, crisp, delightful style."—*San Francisco Call.*

No. 244. The Millionaires.

A Novel. By F. FRANKFORT MOORE, author of "A Gray Eye or So," etc.

"Whoever would spend a half day in the company of clever and entertaining people should take for an afternoon's companion F. Frankfort Moore's 'The Millionaires.' . . . This is one of the brightest of summer novels."—*Detroit Free Press.*

☞ *This Bulletin of new publications is issued on the first of each month, and will be regularly mailed to any address, gratis, upon request. Address* D. APPLETON AND COMPANY, 72 Fifth Avenue, New York.



WEBSTER'S

Hon. D. J. Brewer, Justice of U. S. Supreme Court, says:
"I commend it to all as the one great standard authority."

It excels in the ease with which the eye finds the word sought; in accuracy of definition; in effective methods of indicating pronunciation; in terse and comprehensive statements of facts and in practical use as a working dictionary.

Specimen pages etc., sent on application.

G. & C. MERRIAM CO., Publishers, Springfield, Mass., U. S. A.

INTERNATIONAL DICTIONARY

BY THE LATE GEORG EBERS.

ARACHNE.

An Egyptian Romance. By Dr. GEORG EBERS, author of "Uarda," "Joshua," "An Egyptian Princess," etc. Uniform edition. In two volumes. 16mo. Per volume, cloth, 75 cents; paper, 40 cents.

"It is full of warm life as well as knowledge. It is a most artistic and satisfying story, and the archæologist is subordinated to the artist. The love romance is prettily conceived and developed, and the era selected gives ample opportunities for novelty of description and originality of surprises."—*Boston Saturday Evening Gazette.*

"The book has all the power and charm of Ebers's other historical romances, and should be a distinct success in this country."—*Washington Times.*

"'Arachne' may be recommended as a charmingly entertaining story, which will more than repay one for reading."—*Chicago Evening Post.*

DR. EBERS'S OTHER BOOKS.

Each, 16mo, cloth, 75 cents per volume; paper, 40 cents.

BARBARA BLOMBERG. Translated by Mary J. Safford. 2 volumes.

IN THE BLUE PIKE. Translated by Mary J. Safford. 1 volume.

IN THE FIRE OF THE FORGE. Translated by Mary J. Safford. 2 volumes.

CLEOPATRA. Translated by Mary J. Safford. 2 volumes.

A THORNY PATH. (Per Aspera.) Translated by Clara Bell. 2 volumes.

AN EGYPTIAN PRINCESS. Translated by Eleanor Grove. 2 volumes.

UARDA. Translated by Clara Bell. 2 volumes.

HOMO SUM. Translated by Clara Bell. 1 volume.

THE SISTERS. Translated by Clara Bell. 1 volume.

A QUESTION. Translated by Mary J. Safford. 1 volume.

THE EMPEROR. Translated by Clara Bell. 2 volumes.

THE BURGOMASTER'S WIFE. Translated by Mary J. Safford. 1 volume.

A WORD, ONLY A WORD. Translated by Mary J. Safford. 1 volume.

SERAPIS. Translated by Clara Bell. 1 volume.

THE BRIDE OF THE NILE. Translated by Clara Bell. 2 volumes.

MARGERY. (Gred.) Translated by Clara Bell. 2 volumes.

JOSHUA. Translated by Mary J. Safford. 1 volume.

THE ELIXIR, AND OTHER TALES. Translated by Mrs. Edward H. Bell. With Portrait of the Author. 1 volume.

LORENZ ALMA TADEMA: HIS LIFE AND WORKS. Translated by Mary J. Safford. 1 volume.

RICHARD LEPSIUS: A BIOGRAPHY. Translated by Zoe Dana Underhill. 1 volume.

ALSO,

THE STORY OF MY LIFE. Translated by Mary J. Safford. With Portraits. 12mo. Cloth, $1.25.

D. APPLETON AND COMPANY, NEW YORK.

1898.

FIFTY-FOURTH YEAR.

Eclectic Magazine

OF

Foreign Literature, Science, and Art.

"THE LITERATURE OF THE WORLD."

THE ECLECTIC MAGAZINE reproduces from all the leading FOREIGN PERIODICALS those articles of interest or value to AMERICAN READERS. It will endeavor to consult the taste of all thoughtful and intelligent people, and to present impartially the most valuable articles by the ablest writers on both sides of the great questions of the day which are occupying the attention of the literary and scientific world.

The yearly numbers of the ECLECTIC comprise 1728 pages—a carefully selected Library in itself—containing:

SCIENCE, REVIEWS,
HISTORY, ESSAYS,
POETRY, CRITICISMS,
PHILOSOPHY, TRAVELS,
BIOGRAPHY, SHORT STORIES.

The following list gives the principal periodicals selected from, and the names of some of the well-known authors whose articles have recently appeared in the ECLECTIC:

PERIODICALS.

Westminster Review,
Contemporary Review,
Fortnightly Review,
The Nineteenth Century,
Popular Science Review,
Blackwood's Magazine,
Cornhill Magazine,
Macmillan's Magazine,
New Review,
National Review,
Chambers's Journal,
Temple Bar,
The Athenæum,
Public Opinion,
Saturday Review,
The Spectator, etc., etc.

AUTHORS.

Rt. Hon. W. E. Gladstone,
Andrew Lang,
Prof. Max Muller,
J. Norman Lockyer, F. R. S.,
James Bryce, M. P.,
William Black,
W. H. Mallock,
Herbert Spencer,
T. P. Mahaffy,
Sir Robert Ball,
Prince Kropotkin,
Archdeacon Farrar,
St. George Mivart,
Rev. H. R. Haweis,
Frederic Harrison,
Karl Blind, etc., etc.

The aim of the ECLECTIC is to be instructive and not sensational, and it commends itself particularly to Teachers, Scholars, Lawyers, Clergymen, and all intelligent readers who desire to keep informed of the intellectual progress of the age.

With the ECLECTIC and one good American Monthly, the reader will be fully abreast of the times.

TERMS: Single copies, 45 cents; one copy one year, $5.00. Trial subscription for three months, $1.00. The ECLECTIC and any $4.00 Magazine to one address, $8.00. Special rates made to clubs of two or more periodicals which include the ECLECTIC.

E. R. PELTON, Publisher, 129 Fifth Ave., New York.

Packer's Tar Soap

The Ideal Cleanser.

Unrivaled for bathing, shampooing, and nursery purposes. Packer's Tar Soap is wholesome and refreshing, and a constant protection against contagion.

"A Luxury for Shampooing."

It is invaluable for cleansing and preserving the hair, and for use in treatment of dandruff and baldness.

THE PACKER MANUFACTURING CO., NEW YORK.

NEW EDITION, REVISED TO MAY 1, 1898.

A History of the United States Navy, from 1775 to 1898.

By EDGAR STANTON MACLAY, A. M. With Technical Revision by Lieutenant Roy C. Smith, U. S. N. New edition, revised and enlarged, with new chapters and several new illustrations. In two volumes. 8vo. Per vol., cloth, $3.50.

"When this work first appeared it was hailed with delight. . . . There are now important additions. The splendid material which Mr. Maclay has collected has been treated in admirable tone and temper. This history of the navy is a standard work."—*Boston Herald.*

"The new edition of this valuable book has rendered the general reader a service."—*New York Sun.*

"The author writes as one who has digged deep before he began to write at all. He thus appears as a master of his material. This book inspires immediate confidence as well as interest."—*New York Times.*

"Mr. Maclay is specially qualified for the work he has undertaken. Nine years has he devoted to the task. The result of his labors possesses not only readableness but authority. . . . Mr. Maclay's story may be truthfully characterized as a thrilling romance, which will interest every mind that is fed by tales of heroism, and will be read with patriotic pride by every true American."—*Chicago Evening Post.*

"It fills a place which has almost escaped the attention of historians. Mr. Maclay's work shows on every page the minute care with which he worked up his theme. His style is precise and clear, and without any pretense of rhetorical embellishment."—*New York Tribune.*

"It has been accepted as a standard authority, and its adoption as a text-book at Annapolis is a sufficient testimony of its technical merit."—*Philadelphia Press.*

"The very best history of the United States Navy in existence."—*Boston Journal.*

"The best history of the United States Navy is that of Edgar S. Maclay."—*Philadelphia Inquirer.*

"Taken as a whole, this history of the navy is the best in print."—*New York Nation.*

"Every page thrills and gives fresh impetus to that yet unshaken faith that there is something in the republic that fashions her sons into invincible defenders of her flag and freedom."—*Boston Globe.*

D. APPLETON AND COMPANY, NEW YORK.

THE MACMILLAN COMPANY'S New Scientific Books.

THE CONTROL OF THE TROPICS.

By BENJAMIN KIDD, author of "Social Evolution."

Cloth, 12mo. Price, 75 cents.

The London Critic's comment:

"Mr. Kidd is to be heartily thanked for providing us with a moral standard and a guiding principle for the formation of a reasonable faith and opinion on these most difficult and important questions."

THE NATURE AND DEVELOPMENT OF ANIMAL INTELLIGENCE.

By WESLEY MILLS, M. D., D. V. S., F. R. S. C., Professor of Physiology in McGill University, Montreal; Author of "Animal Physiology," "Comparative Physiology," etc.

8vo, cloth. Price, $2.00.

"An able treatment of the subject of comparative psychology."—*The Review of Reviews.*

GUESSES AT THE RIDDLE OF EXISTENCE.

By the author of "Questions of the Day."

By GOLDWIN SMITH, author of "The United States."

New edition. Cloth, 12mo. Price, $1.25.

And other Essays on kindred subjects.

"One can not fail to be interested in this plain, serious, and candid statement of the final conclusions of a brilliant mind, reflecting on the experience of a lifetime, as to the ultimate questions of the universe."—*Philosophical Review.*

THE ELEMENTS OF SOCIOLOGY.

By FRANKLIN HENRY GIDDINGS, Professor of Sociology in Columbia University; Author of "The Principles of Sociology," "The Theory of Socialization," etc.

Cloth, crown 8vo. *In press.*

"The Elements of Sociology" will be arranged in accordance with the analysis presented in "The Theory of Socialization," and contains, with abundant descriptive and illustrative matter, the elements of the subject, presented in the simplest and most straightforward manner.

THE STORY OF CHINA.

By DEMETRIUS CHARLES BOULGER, author of "The Life of Gordon," etc.

New and Revised Edition, with Portraits and Maps.

Two volumes. Cloth, 8vo. Price, $9.00.

This important work has been revised and brought up to date by the addition of chapters on the war with Japan and its consequences; on the men—Li Hung Chang and others—who have been in power; on the new influences from Europe, and the parts open to Western nations in the East, etc., etc. The Appendix contains the latest Treaty between Japan and China, the Japanese Imperial Proclamation of May, 1895, etc., etc.

NEW BOOKS

THE GREAT SALT LAKE TRAIL.

By COL. INMAN.

A Companion Volume to "The Old Santa Fé Trail."

By Col. H. INMAN and Hon. W. F. CODY (Buffalo Bill).

Cloth, 8vo. Price, $3.50.

Illustrated with full-page plates and drawings in the text.

The Ranch on the Oxhide.

A story of the ranch life of boys and girls in the far West before the railroad reached Kansas.

Illustrated, cloth, 12mo. Price, $1.50.

The Old Santa Fé Trail.

With photogravures from sketches by Frederic Remington, and drawings in the text, etc.

Cloth, large 12mo. Price, $3.50.

FOUR-FOOTED AMERICANS AND THEIR KIN.

By the author of "Birdcraft," etc.

By MABEL OSGOOD WRIGHT. Edited by Frank M. Chapman. Illustrations by Ernest Seton Thompson.

Cloth, $1.50 net.

By the author of "Citizen Bird," etc.

A new book for the young lovers of animal life. An odd, interesting story about American mammals.

Send for our new Fall Announcement List.

THE MACMILLAN COMPANY, 66 Fifth Avenue, New York City.

NEVER DID A POET SING OF THE BEAUTY OF A SPECTACLED EYE OR INDITE A SONNET TO "MY ADORABLE LADY WITH THE EYEGLASSES."

SIGHT RESTORED
Spectacles Useless

AVOID HEADACHE OR SURGICAL OPERATION. READ "ILLUSTRATED TREATISE ON THE EYE. IMPAIRED VISION, WEAK, WATERY, SORE OR INFLAMED EYES, ASTIGMATISM, PRESBYOPIA, MYOPIA, CATARACT, AND THE WORST DISORDERS OF THE EYE." MAILED FREE. SAVE YOUR EYES.
THE IDEAL COMPANY, 239 BROADWAY, NEW YORK.

Mr. Bookkeeper do you know what the Comptometer is? It costs nothing to find out. It insures accuracy, is twice as rapid as the best accountant and relieves all nervous and mental strain. It would pay your firm to get one.

Write for Pamphlet.
FELT & TARRANT MFG. CO., Chicago.

ROADS TO WEALTH

are shortened by the right kind of education. A Technical Education pays. The shortest route to mastery of technical subjects is correspondence instruction. Success guaranteed. Best and simplest text books free.

CIVIL ENGINEERING

Bridge, Steam, or Electrical Engineering; Mathematics; Chemistry; Mining; Architectural or Mechanical Drawing; Surveying; Plumbing; Architecture; Metal Pattern Drafting; Prospecting; Book-keeping; Shorthand; English Branches

TAUGHT BY MAIL

Circular free. State subject you wish to study. Estab. 1891. 45,000 students and graduates.
The International Correspondence Schools, Box 1168 Scranton, Pa.

$2.00 a Month

MICHIGAN COLLEGE OF MINES.

Supported by the State of Michigan. Practical work. Elective system. Special advantages for men of age and experience. For catalogues, address
Dr. M. E. WADSWORTH, President, Houghton, Mich.

Dr. Hayes, of Buffalo, N. Y.
Cures ASTHMA to Stay Cured.
Correspondence invited. No charge for advice as to curability. Write for Examination Blanks.

Appletons' Guide-Books.

(Revised annually.)

Appletons' General Guide to the United States.

With numerous Maps and Illustrations. 12mo. Flexible morocco, with Tuck, $2.50. (Part I, separately, NEW ENGLAND AND MIDDLE STATES AND CANADA, cloth, $1.25. Part II, SOUTHERN AND WESTERN STATES, cloth, $1.25.)

"'Appletons' General Guide to the United States and Canada' has long been regarded as a standard work, and there can be no doubt that the new and entirely revised edition will be welcomed, not only by foreigners, but by Americans, who every year show an increasing desire to know more about their own country. . . . In the manner in which it covers an immense territory without the omission of any important characteristic, it is entirely without a rival."—*Boston Beacon.*

Appletons' Canadian Guide-Book.

A Guide for Tourist and Sportsman, from Newfoundland to the Pacific. With Maps and Illustrations. 12mo. Flexible cloth, $1.50.

Appletons' Guide-Book to Alaska.

By Miss E. R. SCIDMORE. New edition, including an Account of the Klondike. With Maps and Illustrations. 12mo. Flexible cloth, $1.00.

Appletons' Dictionary of "Greater" New York and Vicinity.

With Maps of New York and Vicinity. Square 12mo. Paper, 30 cents.

D. APPLETON AND COMPANY, NEW YORK.

LATEST ISSUES IN

APPLETONS'

Home-Reading Books.

THE STORY OF ROB ROY.

By Sir WALTER SCOTT, Bart., condensed for home and school reading by Edith D. Harris. 12mo. 60 cents net.

In this abridgment all lengthy descriptions of scenery, historical disquisitions on the times, and a few passages of dialogue and monologue that do not interrupt the continuity of the narrative, have been omitted. Otherwise the original text is retained.

NEWS FROM THE BIRDS.

By LEANDER S. KEYSER. 12mo. Cloth, 60 cents net.

This little book of tidings from birdland has been written with two purposes in mind. The first is, to furnish actual instruction, to tell some new facts about bird life that have not yet been recited. The second purpose of the book is inspiration. Only such incidents are recited as will spur the reader to go out into the fields and woods and study the birds in their native haunts.

HAROLD'S RAMBLES.

By J. W. TROEGER. 12mo. Cloth, 40 cents net. (Second volume of Nature Study Readers.)

The constant aim has been not to weary the child with details, but to give such information as to lead to accurate and more extended observations.

D. APPLETON AND COMPANY, NEW YORK.

THE NEW AND ENLARGED EDITION OF

JOHNSON'S
Universal Cyclopædia

7,264 pages. Type new and larger than before.
130 Colored Maps, including Plans of the Chief Cities of North America and Europe.
3,027 Illustrative Engravings.

Thirty-six Departments in charge of Thirty-six Eminent Scholars as Associate Editors (see opposite page).
Nearly 50,000 Titles.
All Articles written by Specialists.

The Only Original and Really New American Cyclopædia Now on the Market.

CHARLES KENDALL ADAMS, LL. D.,
President of the University of Wisconsin,
EDITOR-IN-CHIEF.

THE WHOLE WORK IS FRESH, SCHOLARLY, AUTHORITATIVE, AND UP TO DATE.

THE EDITOR OF BOOK NOTES says:

"No similar book ever published in this country equals the new JOHNSON'S in method, and none was ever published superior to it in detail; all those now on the market are infinitely inferior to it."

PROSPECTUS AND SPECIMEN PAGES FREE ON APPLICATION.

D. APPLETON AND COMPANY, 72 Fifth Ave., New York.

Johnson's Universal Cyclopædia.

COMPLETE IN EIGHT VOLUMES.

Covers the Whole Round of Knowledge, and is Complete in Every Department.

Editor-in-Chief, CHARLES KENDALL ADAMS, LL. D.,
President of the University of Wisconsin.

Managing Editor, ROBERT LILLEY, M. R. A. S.,
One of the Editors of the Century Dictionary.

Departments and Department Editors.

General Physics.
PROF. EDWARD L. NICHOLS, Cornell University.

Astronomy and Mathematics.
SIMON NEWCOMB, LL. D., Editor Nautical Almanac.

Chemistry.
PROF. IRA REMSEN, M. D., LL. D., Johns Hopkins University.

Geology, Mineralogy, Palæontology, Physical Geography.
GROVE K. GILBERT, U. S. Geological Survey.

Climatology, Meteorology, Descriptive Geography.
MARK W. HARRINGTON, LL. D., Ex-Chief of the U. S. Weather Bureau.

Zoology.
PRESIDENT DAVID STARR JORDAN, Leland Stanford Junior University.

Botany.
PROF. CHARLES E. BESSEY, University of Nebraska.

Anthropology.
MAJOR J. W. POWELL, LL. D., Director U. S. Bureau of Ethnology.

Philology, Linguistics.
PROF. BENJAMIN IDE WHEELER, PH. D., Cornell University.

Greek and Roman Literature.
PROF. BASIL L. GILDERSLEEVE, LL. D., Johns Hopkins University.

English Literature.
PROF. HENRY A. BEERS, Yale University.

Comparative Literature.
PROF. A. R. MARSH, Harvard University.

History, Politics, and Education.
THE EDITOR-IN-CHIEF.

Economics.
PROF. A. T. HADLEY, Yale University.

Agriculture, Forestry, etc.
PROF. LIBERTY H. BAILEY, M. S., Cornell University.

Mining and Metallurgy.
CHARLES KIRCHHOFF, Editor of The Iron Age.

Mechanical Engineering.
ROBERT H. THURSTON, LL. D., Director of Sibley College, Cornell University.

Civil Engineering.
PROF. MANSFIELD MERRIMAN, Lehigh University.

Navigation.
REAR-ADMIRAL E. B. LUCE.

Military Science.
COL. JAMES MERCUR, West Point Academy.

Medicine and Surgery.
DR. WILLIAM PEPPER, Ex-Provost of the University of Pennsylvania.

Archæology and Art.
RUSSELL STURGIS, LL. D., Ex-President of the Architectural League, New York.

Philosophy and Ethics.
DR. WILLIAM T. HARRIS, U. S. Commissioner of Education, and
PROF. J. MARK BALDWIN, College of New Jersey.

Theology, Church Polity, and Church History.

Roman Catholic. BISHOP KEANE, Rector of the Catholic University of America.

Episcopal. WILLIAM S. PERRY, Bishop in the Protestant Episcopal Church in the U. S., Davenport, Iowa.

Methodist. J. F. HURST, D. D., Chancellor of the American University.

Presbyterian. PROF. WILLIS J. BEECHER, D. D., Auburn Theological Seminary.

Congregational. PROF. GEORGE P. FISHER, Yale University.

Lutheran. PROF. HENRY E. JACOBS, D. D., Evangelical Lutheran Theological Seminary, Mt. Airy, Pa.

Baptist. PROF. W. H. WHITSITT, Baptist Theological Seminary, Louisville, Ky.

General Church History and Biblical Literature. REV. SAMUEL MACAULEY JACKSON, D. D., LL. D.

Law.

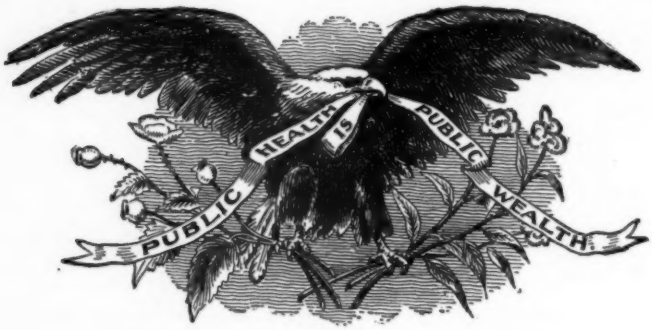
Municipal, Civil, and Constitutional. PROF. F. M. BURDICK, LL. D., Columbia College.

Public or International. PROF. THEODORE S. WOOLSEY, Yale University.

Adapted to the Needs of the Scholar and the Home.

D. APPLETON & COMPANY, 72 Fifth Avenue, New York.

THE SANITARIAN



A MONTHLY MAGAZINE,

Established in 1873.

"THE SANITARIAN for June, 1892, contains a life-sketch of its venerable and distinguished editor, Dr. A. N. Bell, and several contributions upon 'The triumphs of preventive medicine,' in the interest of which Dr. Bell has labored so long and so successfully. * * * No one has been so long, so patient and so persistent in awakening public attention to an interest in this cause. No one has filled so many positions demanding skill in practical work. No one has been more successful in practical work under great difficulties. The writer of the article is Dr. Stephen Smith, the eminent surgeon and author."—*Tennessee State Board of Health Bulletin.*

Based at the outset upon medical knowledge and sanitary service, over an extensive field of observation in various climates in different quarters of the world, large experience in dealing with epidemic diseases, and practical sanitation for the maintenance of health under the most trying circumstances:

"The Sanitarian is"—

AS OTHERS SEE IT—

"The American authority for everything appertaining to the healthful condition of the people at large. The contributions are from medical men whose writings are accepted as authority," (*Virginia Chronicle*); "The best sanitary publication in America," (*Mississippi Valley Medical Monthly*); "Easily maintains its superiority over all similar publications," (*Medical World*); "Has accomplished more good than all of the other sanitary papers put together," (*Hydraulic and Sanitary Plumber*); "The value of a good sanitary publication can hardly be estimated. The superior of THE SANITARIAN we have never seen," (*The Free Methodist*); "The editor, Dr. A. N. Bell, is well known to the mercantile community for his co-operation with the merchants in quarantine reform, and to his profession as a leader in sanitary science," (*N. Y. Journal of Commerce*).

"THE SANITARIAN has been the exponent of the most progressive science of hygiene for more than twenty years," (*The Living Church*).

Two volumes yearly. The volumes begin January and July; subscription at any time.

TERMS: $4.00 a year, in advance; 35 cents a number. SAMPLE COPIES, 20 cents—ten two-cent Postage Stamps.

☞All correspondence and exchanges with THE SANITARIAN, and all publications for review, should be addressed to the Editor,

DR. A. N. BELL,
337 Clinton St., Brooklyn, N. Y.

Félix Gras's Romances.

THE TERROR.

A Romance of the French Revolution. By FÉLIX GRAS, author of "The Reds of the Midi." Uniform with "The Reds of the Midi." Translated by Mrs. Catharine A. Janvier. 16mo. Cloth, $1.50.

"If Félix Gras had never done any other work than this novel, it would at once give him a place in the front rank of the writers of to-day. . . . 'The Terror' is a story that deserves to be widely read, for, while it is of thrilling interest, holding the reader's attention closely, there is about it a literary quality that makes it worthy of something more than a careless perusal."—*Brooklyn Eagle.*

"Romantic conditions could hardly be better presented than in a book of this kind, and above all, in a book by Félix Gras. . . . The romance is replete with interest."—*New York Times.*

"There is genius in the book. The narrative throbs with a palpitation of virile force and nervous vigor. Read it as a mere story, and it is absorbing beyond description. Consider it as a historical picture, . . . and its extraordinary power and significance are apparent."—*Philadelphia Press.*

"The book may be recommended to those who like strong, artistic, and exciting romances."—*Boston Saturday Evening Gazette.*

"Many as have been the novels which have the Revolution as their scene, not one surpasses, if equals, in thrilling interest."—*Cleveland Plain Dealer.*

THE REDS OF THE MIDI.

An Episode of the French Revolution. By FÉLIX GRAS. Translated from the Provençal by Mrs. Catharine A. Janvier. With an Introduction by Thomas A. Janvier. With Frontispiece. 16mo. Cloth, $1.50.

"I have read with great and sustained interest 'The Reds of the South,' which you were good enough to present to me. Though a work of fiction, it aims at painting the historical features, and such works if faithfully executed throw more light than many so-called histories on the true roots and causes of the Revolution, which are so widely and so gravely misunderstood. As a novel it seems to me to be written with great skill."—*William E. Gladstone.*

"Patriotism, a profound and sympathetic insight into the history of a great epoch, and a poet's delicate sensitiveness to the beauties of form and expression have combined to make M. Félix Gras's 'The Reds of the Midi' a work of real literary value. It is as far as possible removed from sensationalism; it is, on the contrary, subdued, simple, unassuming, profoundly sincere. Such artifice as the author has found it necessary to employ has been carefully concealed, and if we feel its presence, it is only because experience has taught that the quality is indispensable to a work which affects the imagination so promptly and with such force as does this quiet narrative of the French Revolution."—*New York Tribune.*

"It is doubtful whether in the English language we have had a more powerful, impressive, artistic picture of the French Revolution, from the revolutionist's point of view, than that presented in Félix Gras's 'The Reds of the Midi.' . . . Adventures follow one another rapidly; splendid, brilliant pictures are frequent, and the thread of a tender, beautiful love story winds in and out of its pages."—*New York Mail and Express.*

D. APPLETON AND COMPANY, NEW YORK.

Walnut Lodge HOSPITAL,

HARTFORD, CONN.

Organized in 1880 for the special Medical Treatment of

Alcohol and Opium Inebriates.

ELEGANTLY situated in the suburbs of the city, with every appointment and appliance for the treatment of this class of cases, including *Turkish*, *Russian*, *Roman*, *Saline*, and *Medicated Baths*. Each case comes under the direct personal care of the physician. Experience shows that a large proportion of these cases are curable, and all are benefited from the application of exact hygienic and scientific measures. This institution is founded on the well-recognized fact that *Inebriety* is a *disease* and *curable*, and all *these cases* require *rest*, *change of thought and living*, etc.

At Murray Hill Hotel, New York city, the second Tuesday of each month, from 12 to 4 P. M.

Applications and all inquiries should be addressed

T. D. CROTHERS, M.D.,
Sup't Walnut Lodge, Hartford, Conn.

THE Yale Review

A QUARTERLY JOURNAL

For the Scientific Discussion of Economic, Political, and Social Questions.

Boston Herald.

"A periodical full of vigorous and strong articles."

Episcopal Recorder.

"This substantial Review is conducted with great ability, and meets a special need in the literary world."

EDITORIAL BOARD:

HENRY W. FARNAM, ARTHUR T. HADLEY,
W. F. BLACKMAN, E. G. BOURNE,
JOHN C. SCHWAB, AND IRVING FISHER,
Professors in Yale University.

Yearly subscription - - - - $3.00
Single number - - - - - - - .75

ISSUED ON THE FIFTEENTH DAYS OF FEBRUARY, MAY, AUGUST, NOVEMBER.

Five volumes of THE YALE REVIEW are now completed. They will be sent to new subscribers at the reduced price of $1.00 per volume, unbound. A specimen copy will be sent free.

TUTTLE, MOREHOUSE & TAYLOR, Publishers,
NEW HAVEN, CONN.

New Books.

A FRENCH VOLUNTEER OF THE WAR OF INDEPENDENCE.

By the Chevalier DE PONTGIBAUD. Translated and edited by Robert B. Douglas. With Introduction and Frontispiece. 12mo. Cloth, $1.50.

"A new light is thrown upon the days of 1776 in this delightful book. . . . The Chevalier tells his story well."—*New York Mail and Express.*

"The importance of such a book as 'A French Volunteer of the War of Independence' can not be gainsaid. Its interest is correspondingly deep, and Americans of to-day can not spend their time more profitably or entertainingly than in perusing this new volume of reminiscences."—*Cincinnati Commercial-Tribune.*

"The book is readable throughout. It throws countless pleasant and instructive side-lights on our early history, and on the manners and customs of an era that has already become a part of dim antiquity."—*Boston Saturday Evening Gazette.*

"From first to last the book is calculated to hold the reader's attention, and the light-hearted, racy style in which it is written adds to its attractiveness."—*San Francisco Bulletin.*

"It could not be possible to overrate the excellence of this book, either as a romance of French-American history, or as the personal memoir of a notable character. Clothed in terms of the purest diction, dealing with historic facts of the most intense interest, brimful of witty *bon-mots*, it carries the reader over an enchanted ground of historical adventures from the famed valley of Auvergne in the heart of France, to Valley Forge in Pennsylvania, and thence over all the hallowed pathways trodden by the fathers of American liberation."—*Philadelphia Item.*

"Historically the story is of great value, and in style it bears all the pleasing qualities of fiction."—*San Francisco Call.*

"As a picture of early days in our country, drawn by a careful and conscientious, a just and sympathetic man of culture and training, the volume is of the utmost importance, and it is a distinct acquisition to the literature of the history of this country."—*New York Press.*

A SOLDIER OF MANHATTAN, and his Adventures at Ticonderoga and Quebec.

By J. A. ALTSHELER, author of "The Sun of Saratoga." No. 225, Appletons' Town and Country Library. 12mo. Cloth, $1.00; paper, 50 cents.

"Stories of colonial times are very popular at the present time, and the incidents of this story are of a nature to keep up the reader's interest throughout. The customs and manners of the times are well described, and the author has caught the spirit of the epoch thoroughly."—*Baltimore Sun.*

"There is a pretty international love story running through the novel . . . There are many interesting descriptions of the social life of the times in the book."—*New York Press.*

"A stirring historical romance."—*San Francisco Argonaut.*

"The romance is well written and exciting."—*Cleveland World.*

"It abounds in dramatic situations; is crisply and attractively written, and no small part of its charm lies in its well-drawn pictures of the life of the people and the spirit of the soldiery."—*Detroit Free Press.*

THE DISASTER. A Romance of the Franco-Prussian War.

By PAUL and VICTOR MARGUERITTE. 12mo. Cloth, $1.50.

"Taken all in all, 'The Disaster' is a charming picture of heroism among the rank and file of the French defenders, and throws much light upon the feelings and experiences of the people in that hour of national humiliation; while its battle and siege scenes are often of thrilling animation. It is well worth an attentive perusal."—*New York Home Journal.*

"The exciting incidents passing in rapid succession are so graphically and artistically described, and the characters participating so clearly portrayed, that there is ceaseless interest, and the reader follows the unfolding of the story with almost breathless attention."—*Boston Globe.*

"This powerful picture of the fate of the Army of the Rhine, by the sons of one of the generals who did their duty, is among the finest descriptions of war that have been penned."—*London Athenæum.*

"It is an addition to the literature of the Franco-Prussian War, which will be welcomed by all who are interested in the history of that struggle."—*Brooklyn Eagle.*

"The book once closed, we perceive that the reading has done us good; that it has left us not saddened, but stimulated; that our eyes are dry, and that the blood runs more rapidly in our veins. Our soul has been stirred in its best part, our mind has been elevated, our heart is filled with generous sentiment."—*Boston Journal.*

"'The Disaster' is a serious effort that can not fail to create widespread interest."—*Chicago Evening Post.*

"Has the authority of knowledge."—*New York Nation.*

"Stands alone as the very best military novel of the day."—*Boston Saturday Evening Gazette.*

THE BROOM OF THE WAR-GOD. A Story of the Recent War between the Greeks and Turks.

By HENRY NOEL BRAILSFORD. 12mo. Cloth, $1.25.

"The book is a fine story of war times, not without its love interest, and will be sure to win many admirers."—*New York Press.*

"'The Broom of the War-God' must be commended as a book of decidedly unusual quality. It is vivid, strong, realistic, and never sensational."—*Brooklyn Eagle.*

"Mr. Brailsford is not pretending to write history, but he has given us, by his selection of significant details, a historical picture of convincing reality that is entitled to the warmest appreciation."—*Philadelphia Times.*

"The book has more than a passing interest; it is an excellent contribution to history on the side of romance."—*Boston Saturday Evening Gazette.*

"It is a remarkable picture, drawn with bold and telling strokes, and full of life and action."—*Detroit Free Press.*

"Mr Brailsford is to be congratulated on the production of a book that has historical as well as artistic value."—*Boston Beacon.*

"Mr. Brailsford is a literary artist, and while he interests us by his vivid portraiture, he also charms us by the poetic strain of his narration and the clearness and beauty of his style. . . . The work is the best contribution to the inside history . . . of that war that has yet been written."—*Philadelphia Public Ledger.*

"The story is captivating, both as to plot and the manner of its development."—*San Francisco Call.*

D. APPLETON AND COMPANY, NEW YORK.

NEW BOOKS.

The Play of Animals.

By KARL GROOS, Professor of Philosophy in the University of Basel. Translated, with the Author's co-operation, by Elizabeth L. Baldwin. With a Preface and an Appendix by J. Mark Baldwin. 12mo. Cloth, $1.75.

"The book is a treasure-house of the most amusing and interesting stories about the entire brute creation, from elephants to ants, all adduced as illustrating some mental process. We feel that we are brought into closer contact with and a better understanding of those faithful friends from whom we learn so much."—*Boston Beacon.*

The Study of the Child.

A Brief Treatise on the Psychology of the Child, with Suggestions for Teachers, Students, and Parents. By ALBERT R. TAYLOR, Ph. D., President of the State Normal School, Emporia, Kansas. Volume XLIII, International Education Series. 12mo. Cloth, $1.25.

"We agree . . . in approving it a sound and wholesome book on child study. . . . For the large and increasing class of educated women to whom motherhood is the greatest of professions, and teaching next to it in importance for the future of the race, the study of the book will bring many helpful and inspiring suggestions."—*Boston Congregationalist.*

Studies of Good and Evil.

By JOSIAH ROYCE, Professor of the History of Philosophy in Harvard University. 12mo. Cloth, $1.50.

"Professor Royce is well known as one of the ablest writers on philosophical and ethical subjects in the country, and what he says on these themes is always worthy of attention."—*Brooklyn Eagle.*

"To any one at all interested in the deeper intellectual problems of the time, these essays by Professor Royce will open lines of thought that tend inevitably to a broadened mental horizon."—*Boston Beacon.*

The Story of the Mind.

By Prof. JAMES MARK BALDWIN, of Princeton University. Library of Useful Stories. 16mo. Illustrated. Cloth, 40 cents.

"A volume that has long been needed, and the subject has here been treated by a master hand. It is one of the best introductions to the subject of psychology with which we are acquainted. The practical lessons it tells or implies are of the utmost value. . . . We strongly recommend the book to serious readers, especially to those who have hitherto avoided books on psychology as being too abstruse and dry."—*Boston Saturday Evening Gazette.*

Outlines of the Earth's History.

By Prof. N. S. SHALER, of Harvard University. Illustrated. 12mo. Cloth, $1.75.

"Any one who reads the preliminary chapters will not stop until he has read the entire book. The subject is certainly one of supreme interest, and it would be hard to find any one more competent to write about it than Professor Shaler."—*New York Herald.*

"Professor Shaler's bald title does not do him justice. It is too modest, and gives only the barest idea of the richness of the contents which lie between the covers of his book. From the first page, onward, it reads like a romance, and holds the attention with engrossing interest."—*New York Bookman.*

D. APPLETON AND COMPANY, NEW YORK.

THE SPANISH LANGUAGE. Books which Teach it.

Spanish-and-English Pocket Dictionary

Of the Spanish and English Languages. Containing the latest Scientific, Military, Commercial, Technical, and Nautical Terms. Based upon Velázquez's unabridged edition. In Two Parts: Spanish-English and English-Spanish. 32mo. Cloth, $1.00.

Velázquez's Spanish-English Dictionary.

A Pronouncing Dictionary of the Spanish and English Languages; with the addition of more than 8,000 Words, Idioms, and Familiar Phrases. In Two Parts. I, Spanish-English; II, English-Spanish. 1310 pages, large 8vo, $5.00.

An Abridged Edition of Velázquez.

847 pages. 12mo. $1.50.

De Tornos's Combined Spanish Method.

With a Pronouncing Vocabulary. By ALBERT DE TORNOS. 12mo. $1.25.

Key to De Tornos. 75 cents.

An Easy Introduction to Spanish Conversation.

By VELÁZQUEZ. 100 pages. 18mo. 35 cents.

A New, Practical, and Easy Method of Learning the Spanish Language.

After the System of F. AHN, Doctor of Philosophy and Professor at the College of Neuss. 12mo. 75 cents.

Key to Same. 25 cents.

Butler's Spanish Teacher and Colloquial Phrase-Book.

An Easy and Agreeable Method of acquiring a Speaking Knowledge of the Spanish Language. By FRANCIS BUTLER. 293 pages. 18mo. 50 cents.

The Spanish Phrase-Book;

Or, Key to Spanish Conversation. By E. M. DE BELEM. 18mo. 30 cents.

Ollendorff.

A Method of Learning to Read, Write, and Speak the Spanish Language.

After the System of Ollendorff. By MNO. VELÁZQUEZ and T. SIMONNÉ. 560 pages. 12mo. $1.00.

Key to Ollendorff. 174 pages. 12mo. 50 cents.

Prendergast's Mastery Series.

Spanish, 45 cents.

D. APPLETON AND COMPANY, NEW YORK.

The Historical Reference-Book.

Comprising a Chronological Table of Universal History, a Chronological Dictionary of Universal History, a Biographical Dictionary. With Geographical Notes. For the use of Students, Teachers, and Readers. By LOUIS HEILPRIN. Fifth edition, revised to 1898. The Concise Knowledge Library. Uniform with "Natural History" and "Astronomy." Crown 8vo. Half leather, $2.00.

"Quite the most compact, convenient, accurate, and authoritative work of the kind in the language. It is a happy combination of history, biography, and geography, and should find a place in every family library, as well as at the elbow of every scholar and writer. . . . The typography remains ideally good for such a manual."—*New York Evening Post.*

"One of the most complete, compact, and valuable works of reference yet produced."—*Troy Daily Times.*

"An invaluable book of reference, useful alike to the student and the general reader. The arrangement could scarcely be better or more convenient."—*New York Herald.*

"The conspectus of the world's History presented in the first part of the book is as full as the wisest terseness could put within the space."—*Philadelphia American.*

"We miss hardly anything that we could consider desirable, and we have not been able to detect a single mistake or misprint."—*The Nation.*

"So far as we have tested the accuracy of the present work we have found it without flaw."—*Christian Union.*

"The conspicuous merits of the work are condensation and accuracy. These points alone should suffice to give 'The Historical Reference-Book' a place in every public and private library."—*Boston Beacon.*

"The method of the tabulation is admirable for ready reference."—*New York Home Journal.*

A Chronological Table of Universal History.

Extending from the Earliest Times to the Year 1892. For the use of Students, Teachers, and Readers. By LOUIS HEILPRIN. 12mo. 200 pages. Cloth, $1.25.

This is one of the three sections comprised in "The Historical Reference-Book," bound separately for convenience of those who may not require the entire volume. Its arrangement is chronological, each paragraph giving, in briefest practical form, an outline of the principal events of the year designated in the margin.

D. APPLETON AND COMPANY, NEW YORK.

LITERATURES OF THE WORLD.

Edited by EDMUND GOSSE,

Hon. M. A. of Trinity College, Cambridge.

A SUCCESSION of attractive volumes dealing with the history of literature in each country. Each volume will contain about three hundred and fifty 12mo pages, and will treat an entire literature, giving a uniform impression of its development, history, and character, and of its relation to previous and to contemporary work.

Each, 12mo, cloth, $1.50. Now ready:

SPANISH LITERATURE.

By JAMES FITZ MAURICE-KELLY, Member of the Spanish Academy.

"The introductory chapter has been written to remind readers that the great figures of the silver age—Seneca, Lucan, Martial, Quintilian—were Spaniards as well as Romans. It further aims at tracing the stream of literature from its Roman fount to the channels of the Gothic period; at defining the limits of Arabic and Hebrew influence on Spanish letters; at refuting the theory which assumes the existence of immemorial romances, and at explaining the interaction between Spanish on the one side and Provençal and French on the other. Spanish literature extends over some hundred and fifty years, from the accession of Carlos Quinto to the death of Felipe IV. This period has been treated, as it deserves, at greater length than any other."—*From the Preface.*

ITALIAN LITERATURE.

By RICHARD GARNETT, C. B., LL. D., Keeper of Printed Books in the British Museum.

"Dr. Garnett's book is so excellent, in view of the ground it covers, so critical, so instructive, that, when one finishes it, it is with regret that there was not more of it."—*New York Mail and Express.*

ANCIENT GREEK LITERATURE.

By GILBERT MURRAY, M. A., Professor of Greek in the University of Glasgow.

"Mr. Murray has produced a book which fairly represents the best conclusions of modern scholarship with regard to the Greeks."—*London Times.*

FRENCH LITERATURE.

By EDWARD DOWDEN, D. C. L., LL. D., Professor of English Literature at the University of Dublin.

"Certainly the best history of French literature in the English language."—*London Athenæum.*

MODERN ENGLISH LITERATURE.

By the EDITOR.

"Mr. Gosse's most ambitious book, and probably his best. It bears on every page the traces of a genuine love for his subject, and of a lively critical intelligence. Moreover, it is extremely readable—more readable, in fact, than any other single volume dealing with this same vast subject that we can call to mind."—*London Times.*

IN PREPARATION.

AMERICAN. By Prof. MOSES COIT TYLER.
GERMAN. By Dr. C. H. HERFORD, Professor of English Literature in the University of Wales.
HUNGARIAN. By Dr. ZOLTÁN BEÖTHY, Professor of Hungarian Literature at the University of Budapest.
LATIN. By Dr. ARTHUR WOOLGAR VERRALL, Fellow and Senior Tutor of Trinity College, Cambridge.
JAPANESE. By W. G. ASTON, C. M. G., M. A., late Acting Secretary at the British Legation at Tokio.
MODERN SCANDINAVIAN. By Dr. GEORG BRANDES, of Copenhagen.
SANSCRIT. By A. A. MACDONELL, M. A., Deputy Boden Professor of Sanscrit at the University of Oxford.

THE ART OF TAXIDERMY.

By JOHN ROWLEY, Chief of the Department of Taxidermy in the American Museum of Natural History. Illustrated. 12mo. Cloth, $2.00.

"A volume on a technical subject which meets the needs of the amateur and professional alike. The plan of the book, as well as the author's command of his subject, have contributed to the success of the volume."—*Philadelphia Press.*

"Every step for the proper preparation of large and small game of birds and reptiles is given with perfect clearness. There are admirable lists of the necessary tools and chemicals, and clever suggestions for makeshifts. . . . The value of the book is increased by a full index."—*Boston Beacon.*

D. APPLETON AND COMPANY, 72 Fifth Avenue, New York.

Give your attention

TO THE PORES OF THE SKIN; keep them clean and their action healthy. You can not overestimate the importance of this.

Soap does not and can not clean the pores; in fact, it is more apt to clog than to clean them.

A little thought on this question will show you the importance of remembering that

Cutelix Cleans the Pores

Throughout their entire length, and keeps the sebaceous glands in prime working order.

Cutelix also exerts a wonderful healing and curative effect on all injuries or affections of the skin.

If your druggist can not supply you, send thirty cents (five cents to pay for packing), and a bottle will be sent by express. Address

Cutelix Company, 253 Broadway, New York.

Not every one can ride a Bicycle, but every one can ride a Tricycle. Affords all the pleasure and exercise of Bicycling without the nervous strain and danger.

You cannot fall, and you stop when you want to. No instruction necessary. '98 model weighs only 32 lbs. '99 model just out, weight 31 lbs.

Send for Free Illustrated Catalogue.

TINKHAM CYCLE CO.

306, 308, 310 WEST 59TH ST., NEW YORK.

A Remarkable Success.

Evelyn Innes.

A Story. By GEORGE MOORE, author of "Esther Waters," etc. 12mo. Cloth, $1.50.

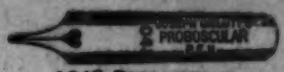
"The marvelously artistic analysis of the inner life of this remarkable woman exercises a peculiar fascination for cultivated people. . . . There are splendid interpretations of Wagner's best works, of the differences between ancient and modern music, of the weaknesses of agnosticism, and of the impossibility of finding happiness and freedom from misery in a life of sin. The manner of the doing is wonderfully fine. Mr. Moore's artistic treatment provokes one's admiration again and again. . . . It seems as if one could pass over no single sentence without losing something. . . . The appeal of the book is to the class of people best worth writing for, cultivated, intellectual people, who can appreciate something better than the commonplace stories which invariably come out right. Its literary quality is high; there are very fine things about it, and one feels that 'Evelyn Innes' is the work of a master."—*Boston Herald.*

D. APPLETON AND COMPANY, NEW YORK.

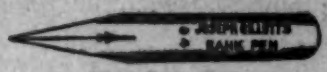
JOSEPH GILLOTT'S NEW PENS,

Extra Smoothness of Point.

1008 Diamond-Stub.

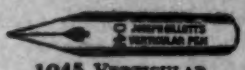


1042 Proboscular.

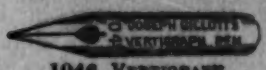


1044 Bank Pen.

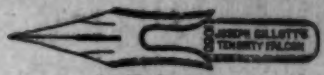
1047 Multiscript.



1045 Verticular.



1046 Vertigraph.



1060 Falcon.

Special Ease of Action.

These pens have the extra smoothness of point, also the special ease and firmness of action required for careful business writing, or for the rapid scribbling of professional and literary men.

For fine and extra-fine writing recourse may be had to the Gillott series of pens so long familiar to the people:

303, 404, 170, 604 E. F., 332, 601 E. F.

(Paris Medal.) The Standard Pens of the World. (Chicago Award.)

91 John Street, NEW YORK.

JOSEPH GILLOTT & SONS, HENRY HOE, Sole Agent.

THE LIBRARY OF USEFUL STORIES.

A series of little books dealing with the different branches of knowledge, by writers of authority in their various spheres. Illustrated. 16mo. Cloth. Each, 40 cents.

The Story of Photography.

By Alfred T. Story. A new volume in the Library of Useful Stories.

"The subject is treated in the most lucid manner, and no better book could be placed in the hands of the intelligent amateur photographer who wishes to become acquainted with the evolution of his hobby as well as the reasons for the processes in which he frequently too blindly deals. . . . The book is fully up to date, and we know of no better volume for the general reader."—*Boston Saturday Gazette.*

The Story of Life in the Seas.

By Sydney J. Hickson.

The Story of a Piece of Coal.

By Edward A. Martin.

The Story of Electricity.

By John Munro, author of "Electricity and its Uses," "Pioneers of Electricity," etc.

The Story of the Stars.

Simply told for General Readers. By George F. Chambers, F. R. A. S.

The Story of "Primitive" Man.

By Edward Clodd.

The Story of the Earth.

By H. G. Seeley, F. R. S.

The Story of the Plants.

By Grant Allen.

The Story of the Solar System.

By George F. Chambers, F. R. A. S.

The Story of Extinct Civilizations of the East.

By R. E. Anderson.

The Story of Germ Life.

By H. W. Conn.

The Story of the Earth's Atmosphere.

By Douglass Archibald, M. A.

Others in preparation.

These books are for sale by all booksellers; or they will be sent by mail on receipt of price, by the publishers,

D. APPLETON AND COMPANY, 72 Fifth Avenue, New York.

AND

Time Use

always make the

Remington

Standard Typewriter

and its operator better friends.

NEW MODELS 6, 7 and 8 (Wide Carriage)

WYCKOFF, SEAMANS & BENEDICT,
327 Broadway, New York.

Bensolyptus

(Schieffelin's)

Bensolyptus is an agreeable alkaline solution of various highly approved antiseptics, all of which are of recognised value in

Catarrhal Affections

because of their cleansing, soothing and healing properties. Bensolyptus is highly recommended in all inflammations of mucous membranes, especially in diseases of the

Nose and Throat
and as a
Mouth-Wash and Dentifrice.

It is also of value for internal use in affections of the alimentary tract attended with fermentation of food, eructations, and heart-burn.

Send for pamphlet to

Schieffelin & Co., New York.

F. W. DEVOE & CO.

ESTABLISHED 1852.
OFFICES: COR. FULTON & WILLIAM STS.
NEW YORK.

ARTISTS' MATERIALS.

SKETCHING OUTFITS OF ALL KINDS
TUBE COLORS · WATER COLORS · CRAYONS
DRAWING PAPER · CANVAS · BRUSHES · OILS & MEDIUMS
MATHEMATICAL INSTRUMENTS
HOUSE PAINTERS' COLORS
FRESCO COLORS · FINE VARNISHES
Correspondence invited. Catalogues of our different departments to responsible parties.
COFFIN-DEVOE & CO. · 176 RANDOLPH ST. · CHICAGO

"Always an Exquisite Delight."

The One Perfect Music Box

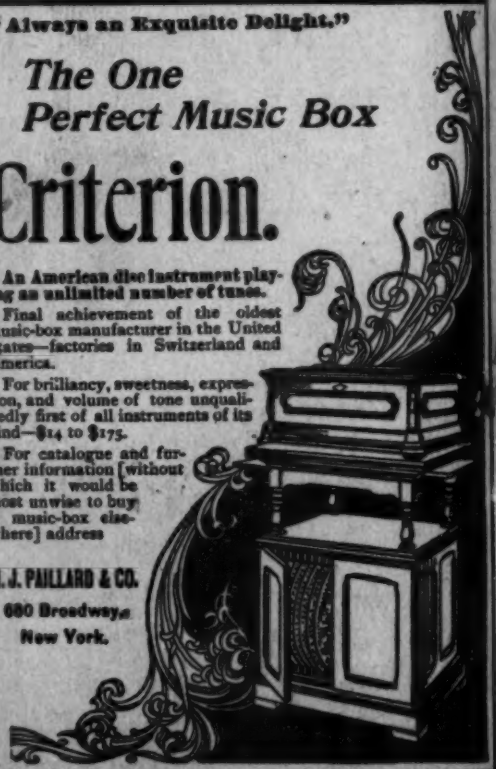
Criterion.

An American disc instrument playing an unlimited number of tunes.

Final achievement of the oldest music-box manufacturer in the United States—factories in Switzerland and America.

For brilliancy, sweetness, expression, and volume of tone unqualifiedly first of all instruments of its kind—$14 to $175.

For catalogue and further information [without which it would be most unwise to buy a music-box elsewhere] address



M. J. PAILLARD & CO.
680 Broadway,
New York.